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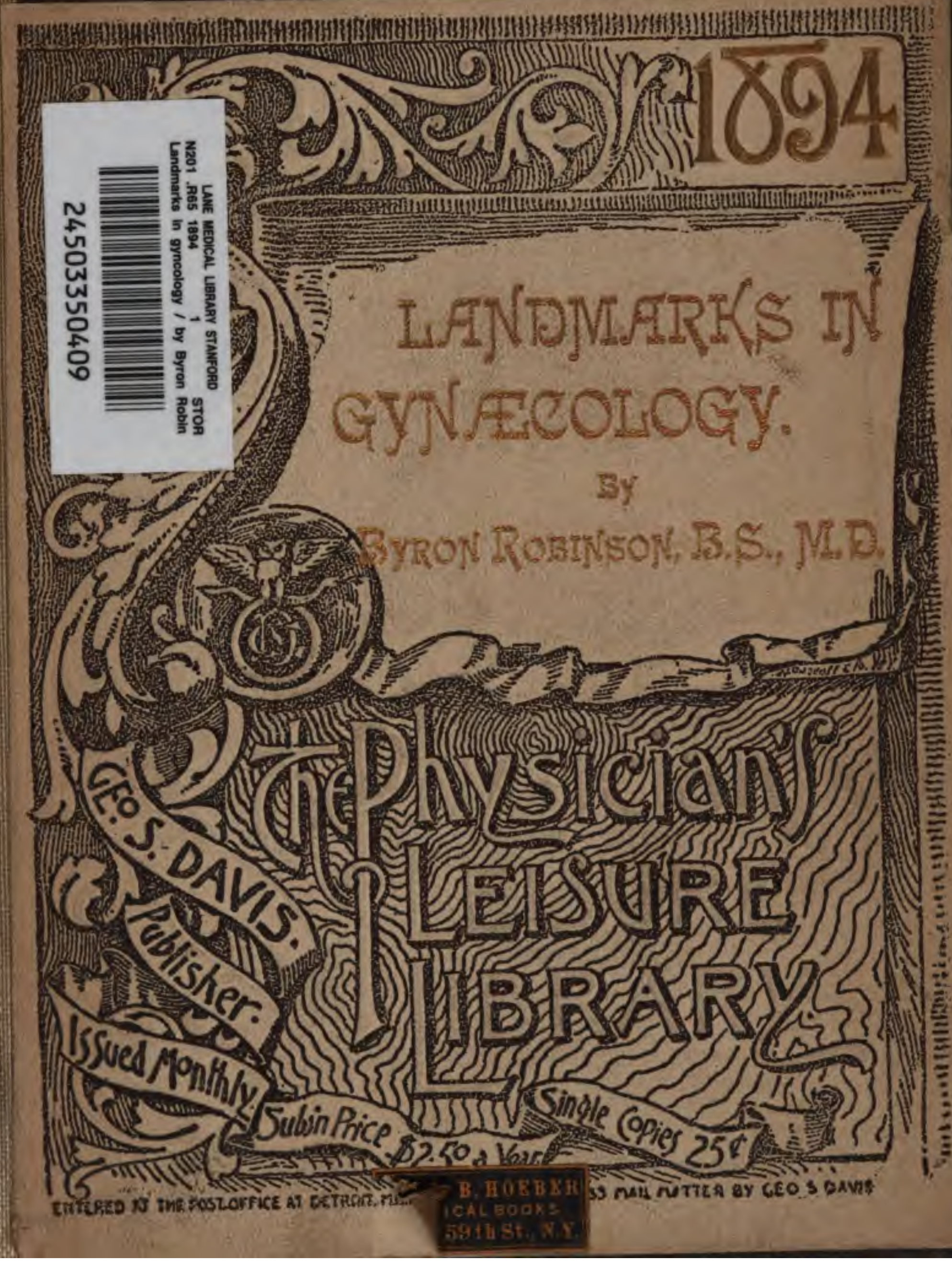

1894

LANDMARKS IN GYNÆCOLOGY.

By

BYRON ROBINSON, B.S., M.D.

The Physician's Leisure Library

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LANDMARKS

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GYNÆCOLOGY.

BY

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Professor of Gynæcology in the Chicago Post-Graduate School; Gynæcologist to the Woman's Hospital, the Charity Hospital, and the Post-Graduate Hospital.

"*To the solid ground of Nature*
Trusts the mind which builds for aye."—WORDSWORTH.

VOLUME I.

1894.
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THESE LECTURES ARE DEDICATED
TO
MR. LAWSON TAIT,
OF
BIRMINGHAM, ENGLAND,
MY HONORED TEACHER, WHOSE BRILLIANT GENIUS AND UNTIRING
ENERGY HAVE BEEN AN INSPIRATION FOR MENTAL
PROGRESS AND SURGICAL POSSIBILITIES.

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PREFACE.

The following pages contain an abstract of some of my lectures at the Chicago Post-Graduate Medical School during the past three years. I have divided the subject into prominent "Landmarks," for convenience of teaching and for the purpose of impressing upon practitioners the chief features in gynæcology.

The "Landmarks in Gynæcology" which I consider of chief importance are: (1) Anatomy; (2) Menstruation; (3) Labor; (4) Abortion; (5) Gonorrhœa; (6) Tumors. Probability is the rule of life, and it is safe to say that in one of these landmarks will be found the disease from which the patient suffers. This classification calls attention to the significant clinical events in the life of a woman.

I wish to acknowledge my indebtedness to D. Berry Hart, J. Bland Sutton, and Bernard Shultze. Much of the material, however, upon which these lectures are founded has been gleaned from personal work in dissections, from autopsies, and from clinical work in gynæcological and abdominal surgery. I claim, therefore, to present in this little book some original views and new classifications—the result of much personal labor.

Many suggestions and much aid in preparing this volume for publication have come from my wife and professional associate, Dr. Lucy Waite, whose judgment I have learned to respect.

BYRON ROBINSON.

Chicago, May, 1894.

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THE FIRST LANDMARK IN GYNÆCOLOGY—ANATOMY.

Pelvic anatomy is of all regional anatomy the most difficult of comprehension. There are several important elements which complicate the study of this portion of the human system, aside from the fact that opportunities for personal work in pelvic dissections are everywhere limited.

1. The pelvic organs possess the property of elasticity to a wonderful degree.

2. They have the capacity to alter their conditions without losing the power to return to normal.

3. They have great mobility without the danger of becoming dislocated.

It will be easily seen from the above propositions that pelvic anatomy is complicated and requires much study to be of practical utility.

The female genitals may be studied by considering the external parts; by examining the internal organs; and by studying the genital tract as it develops, both in the human being and in the lower animals. Our knowledge of pelvic anatomy is derived from dissections; from frozen sections; from spirit-hardened sections; from the *camera lucida;* and from clinical observation.

The pelvic organs are contained in a bony cavity which serves as a protection. The hips or innominate bones constitute the lateral, and the sacrum the posterior, portions of the pelvic box. The coccyx aids in closing the outlet in such a manner that in parturition it will yield and then return to normal.

The pelvic box has a brim or inlet, which when the body is in the erect position forms an angle with the horizon of about 60 degrees. The normal uterus, therefore, may be considered in the standing posture as parallel with the earth's plane.

The outlet of the pelvic cavity is irregular—the edge being made up of both bones and ligaments. The pelvic box serves not only to protect the genitals, but also to anchor them. The muscles and ligaments which keep the different parts of the genitals in proper relation to each other have fixed points of attachment on the pelvic bones. When the woman stands erect, the lower end of the coccyx is on a level with the lower third of the posterior surface of the pubis. It will be noticed, by comparison with this description of the normal pelvic relations, that the illustrations in the works of Thomas, Pozzi and many others are incorrect as regards the relative position of the pubis and coccyx.

Besides the female generative organs the pelvic cavity contains the rectum and bladder; and it is important to remember that the generative organs together with these two—the bladder and rectum—perform nearly all their functions in the pelvic box.

The development of the female genitals is of supreme importance, as malformations are only arrested growths. The genitals arise from the Wolffian body. If one take the fœtus of a pig a month old, or the human fœtus six weeks old, and carefully open the abdomen with a pair of scissors, he will note that almost the entire abdomen is filled with two bodies, viz.: the liver and the Wolffian bodies. The latter lie along the backbone, reaching from the thoracic diaphragm to the pelvic diaphragm. The Wolffian body is spindle-shaped, and two ducts can be seen running from the fore part of it to the rectum.

There are three distinct stages to the Wolffian body:

The first stage consists of the pronephros or head kidney, and its ureter or duct. The head kidney quickly ceases to act in the human fœtus, but its ureter or duct in the female becomes the Fallopian tube—in the male it dies out, leaving only the hydatid of Morgagni. The ureter originally contained urine, but it soon becomes transformed into an egg-channel. The two oviducts coalesce at about their middle third to form the single uterus, the septum disappearing from below upwards; the lower thirds coalesce to form the single vagina; the upper thirds do not coalesce, but remain separate and are known as the Fallopian tubes. Thus by coalescence of the ducts of the first kidney are formed the vagina and uterus, while the Fallopian tubes represent the non-coalesced portions. The hydatid of Morgagni represents the drawn-out end of the duct.

The second stage of the Wolffian body is known as the mesonephros or middle kidney, with its ureter; this is the kidney of the fœtal life. The middle kidney atrophies in a fœtal pig in some seven weeks, in the human being in about six weeks. In the female the ureter becomes the duct of Gartner, while the kidney itself becomes the parovarium—both fœtal relics. In the male the ureter becomes the vas deferens, while its kidney is transformed into the head of the testicle or epididymis. Observe that the duct of the first kidney carries urine and then eggs, while the duct of the second kidney carries urine and then semen.

The third stage of the Wolffian body consists of the adult kidney and its ureter.

The genital ridge grows out of the internal surface of the Wolffian body, and does not show whether it will become testicle or ovary until after ten weeks of human fœtal life.

Notice the important fact that the genitals and the kidney have an identical origin, *i.e.*, the Wolffian body, and are therefore anatomically and physiologically associated in the nerve- and blood-supply. A disturbance in the one will produce disturbance in the other.

From a knowledge of genital development we can understand more intelligently the absence of all or part of the genitals (in inflammation or atrophy), and their non-symmetrical or double development.

Atrophy and hypertrophy are explained by the blood supply. To the scientific man the genito-urinary development is of the highest interest, as it indicates to him how the flaws in malformation occur.

The external genitals are: the mons veneris, labia majora and minora, clitoris, vestibule, meatus urinarius, fossa novicularis, and fourchette. The vulva, or external genitals, include all the parts external to the hymen. The hymen is the lower end of the vagina. The most important parts of the external genitals, in medical and surgical practice, are the clitoris and the urethral orifice.

The clitoris, in proportion to its size, is supplied with five times as many nerves as the penis. Being so extremely sensitive, it is very important that all adhesions between it and the prepuce should be broken up so that the patient's attention may not be attracted to it, enticing to masturbation.

The urethral orifice is about three-fourths of an inch below the clitoris. It is advisable to inspect the parts when introducing a catheter, but if no inspection is made the index finger may be inserted into the vagina and the catheter glided along its surface until it comes to the superior vaginal orifice, when a little elevation will cause the instrument to enter the urethral orifice. The mouth of the vulvo-vaginal gland, at the lower end of the labia minora, is also an important point to inspect, as chronic inflammation there indicates gonorrhœal infection.

The vagina is a closed canal connecting the external with the internal genitals. Its anterior and posterior walls are in contact, producing a transverse slit parallel with that of the closed mouth. The vulvar slit is at right-angles with the vaginal orifice.

The internal female genitals consist of the uterus, Fallopian tubes, and ovaries. The uterus is a hollow, muscular organ having the shape of a pear, about two and one-half inches long, one and one-half inches wide, one inch thick, and composed of: a fundus, which lies above the entrance of the Fallopian tube; a body, which lies between the entrance of the tubes and the internal os, or the point where the perineum passes from the uterus to the bladder; and a cervix or neck, which is entirely unprotected by peritoneum in front. The function of the uterus is gestation and expulsion.

The lining membrane of the uterus, the endometrium, is composed of tubular glands and of a muscular part. The endometrium gestates; the musculature expels the contents. The uterus and the neck differ in functional structure; the former has more glands and more muscle than the latter, and is covered both anteriorly and posteriorly by peritoneum, while the neck has only a posterior peritoneal covering. The artery supplying the uterus is very tortuous, while that supplying the neck is straight, with a very thick circular coat of muscle by which contraction readily arrests the flow of blood in case of cervical and arterial laceration. The neck is supplied largely by cerebro-spinal nerves (third and fourth sacral) and some sympathetic, while the uterus is almost entirely supplied by sympathetic nerves from the hypogastric plexus. The uterus is a rhythmic organ, while the neck is a still organ. The neck has much connective tissue, and the uterus very little. The uterus gestates and is always ready to expel its contents, while the neck is never ready for an abortion, but stands guard over the uterus, keeping would-be deserters in and intruders out. The sober cervix quiets the uneasy, rhythmical uterus. The cervix develops cancer, while the fundus uteri develops myoma. The cervix receives the essential supports.

The Fallopian tubes are a continuation of the uterus; they lie in the free margin of the broad ligament, and are about four and one-half inches long, running in a tortuous manner from the sides of the uterus toward the pelvic wall, and the ampulla or outer part generally partially surrounds the ovary. The inner third of the tube is called the isthmus, the outer two-thirds the ampulla; the lumen of the latter is much larger than that of the isthmus. I discovered that the lumen of the left tube is larger than that of the right.

The tube is covered for about two-thirds of its circumference by the peritoneum or serous layer. The muscular or myomatous coat consists of longitudinal and circular layers which give the tube its wonderful peristaltic movements. The lining membrane, or endosalpinx, is to the practitioner the interesting coat. This consists of a single layer of columnar ciliated epithelium. The cilia all whip toward the uterus. I am inclined to believe there is a glandular structure in the endosalpinx, although many deny it. Comparative anatomy demonstrates glands in the oviducts—*e.g.*, the hen's oviduct secretes lime salts to form an egg-shell, as the egg passes from the ovary to the cloaca. The endosalpinx is thrown into numerous luxuriant parallel folds, especially in the ampulla. These projecting fringes of mucous membrane fill the tubal lumen, and present a varied and beautiful structure under the microscope. The unique feature of the Fallopian tube is that its mucous membrane opens directly into the peritoneal cavity. In this case mucous membrane is directly continuous with serous membrane, and is the most notable landmark in the weak points of the female anatomy as regards disease. Infection tells the story. The Fallopian tube has a periodic rhythm in which it rises to a maximum of peristalsis and sinks to a minimum of rest. It has a monthly motion. The uterus and tubes are the organs of menstruation, governed in this respect by the "automatic menstrual ganglia," situated along their walls.

If the broad ligament is held between the eye and the light, one can see the parovarium, which consists of some twelve tubules, running parallel to each other and pointing like a cone toward the hilum of the ovary. The bases of the tubules open into a common transverse duct called Gartner's duct. The parovarium is the remains of the mesonephros or second kidney. It is a fœtal relic, and is liable after puberty to develop cysts from the size of a pea to that of a child's head. In the sow and cow I have frequently found Gartner's duct partially or completely existing as large as a lead-pencil.

The ovaries are two oval-shaped organs situated in the broad ligaments, and projecting prominently backward through the posterior layer. They are connected to the posterior and lateral surfaces of the uterus by a ligament about an inch long. The ovary measures about one and one-half by one and three-fourths inches, and weighs about ninety grains. It consists of a parenchyma, the home of the Graafian follicles, and of a hilum, the vascular portion. The essential of a Graafian follicle is the membrana granulosa (lined with granular epithelium), which contains the ovum. Disease transmutes these follicles into ovarian tumors or dermoids. The follicles are all developed in the ovarian parenchyma. Papillomata (cancers) almost always have their origin in the hilum of the ovary, which contains the fœtal relics of the middle kidney.

The ovary produces ova. Ovulation is a constant process from before birth until the ovarian tissue gives out; it is not periodic like menstruation, nor does it depend upon the latter. Menstruation is a regular, periodic, rhythmical process, while ovulation is a constant, progressive process. How often ovulation occurs, we do not know. If an ovum is ready at menstruation, it may be carried to the uterus; if not, it drops into the peritoneal cavity and is absorbed. The corpus luteum is no positive sign of pregnancy. I have found two corpora lutea on the ovary of a lamb.

All the pelvic and abdominal organs are outside the peritoneum. The genitals appear as if they were thrust up into the fold of the peritoneum, which holds them in distinct order and relation. The uterus is held in its place: (1) by a supporting beam composed of the anterior vaginal wall and the sacro-uterine ligaments; (2) by the anterior and posterior round ligaments (the latter composed of the ovarian vessels with their peritoneum and surrounding tissue), which simply act like ropes to a ship-mast—they steady it on its supporting beams; (3) by the connective tissue between the uterus and the bladder; (4) by the pelvic fascia which attaches itself to the neck and gives considerable rigid support; (5) by the surrounding peritoneum; (6) by the padding of connective tissue surrounding the vagina; (7) by the arteries, veins, lymphatics, and nerves; and (8) by the levator ani with its fascia above (recto-vesical) and below (anal), forming the unbroken floor on which the uterus rests.

The levator ani is a very important muscle to the gynæcologist. It chiefly strengthens the pelvic outlet, and is the direct counterpart to the thoracic diaphragm. It is in reality the pelvic diaphragm. It acts as a sphincter to the vagina, rectum and urethra. It restores the everted mucous membrane after defecation; it elevates the rectum and strengthens it Dissection shows that its loops blend with the internal and external rectal sphincters. It elevates the coccyx, and thus deepens the curve which aids in retaining the genitals in the pelvis. The levator ani should be considered as three muscles, viz.: (*a*) the pubo-coccygeus, which arises from the posterior surface of the pubis and is inserted into the coccyx and median raphe; (*b*) the obturator coccygeus, which arises from the white line and is inserted into the median raphe and coccyx; and (*c*) the ischeo-coccygeus, which arises from the spine of the ischium and is inserted into the side of the coccyx and sacrum. The pubo-coccygeus by its tone forces the rectum together from side to side. The levator ani is very much strengthened by the recto-vesical fascia above and the anal fascia below.

Between the recto-vesical fascia and the peritoneum there is a large amount of areolar tissue—fine and delicate, as white as snow and as soft as eiderdown, reminding one of hoar frost; this serves as a bed for arteries, veins, lymphatics, and nerves.

The uterus rests on the unbroken floor made by the levator ani and its fasciæ.

For practical work we will divide the pelvic floor into a pubic segment and a sacral segment. The pubic segment of the pelvic floor consists of (*a*) recto-pubic fat, (*b*) bladder, and (*c*) anterior vaginal wall. The pubic is the movable segment; it moves with the viscera. It is loose in its connections, and prolapses in sacro-pubic hernia. Its mobility allows of bimanual examination. In labor the pubic segment is elevated and the sacral segment depressed, so that the child's head can pass through between the segments as one passes between two swinging doors—*i.e.*, by pushing one ahead and the other behind.

The sacral segment of the pelvic floor consists of the posterior wall of the vagina, the perineal body, and the rectum. It is fixed to the sacrum and is made of strong tissue. In labor it is forced backward and downward. It is the supporting segment, and does not prolapse. The sacral segment is the lower valve, and the pubic segment the upper valve, of the pelvic floor. The two segments overlap each other, and the only way the fœtus is expelled or the uterus prolapsed is by the separation of the two valves, *i.e.*, the pubic segment is raised and the sacral segment is depressed.

Prolapsus or sacro-pubic hernia is simply a descent of the pubic segment. The uterus itself has nothing to do with prolapse. The causes of uterine prolapse (sacro-pubic hernia) are: (1) intra-abdominal pressure; (2) deficient support in the sacral segment, *i.e.*, the sacrum and coccyx straighten out and the perineal body is split or lacerated; (3) loss of tone in the pubic segment.

The segments of the pelvis are divided by the vagina. In regard to the division of the pelvic floor into segments, I wish to acknowledge my indebtedness to D. Berry Hart, of Edinburgh, who received a gold medal and the Syme scholarship for excellent and original research in pelvic anatomy.

The bladder is important to the gynæcologist, as it and the uterus really act as one organ, from the fact of utero-vesical connection. The bladder is a membranous sac for the purpose of storing and expelling renal secretions. The bladder goes through a rhythm—a diastole and a systole. In autopsies I find two kinds of bladder—the saucer-shaped, and the contracted oval-shaped. In the former the upper and lower surfaces lie in contact, and the organ on median section presents a Y shape. The saucer shape of the bladder is, I think, found in the vast majority of cases, for in abdominal sections we can prove it. The contracted oval shape is probably the systole of the bladder, and lasts but a short time.

The rhythm of the bladder is due to its dominating sympathetic-nerve supply.

The important anatomical point in the interior of the bladder is the trigone bounded by the two ureteral openings and the urethral opening. The surface of the trigone has no folds or wrinkles; its smoothness precludes the dropping of mucous folds into the orifices of the ducts. In the trigone are centred the main cerebro-spinal nerve and many sympathetic nerves. Frequent micturition in pregnancy is not due to the pressure of the fundus on the bladder, but to dragging of the neck of the uterus on the nerves of the trigone of the bladder.

The urethra is one and one-fourth inches long, and opens three-fourths of an inch below the clitoris and just above the margin of the vaginal orifice.

The ureters are two ducts leading from the kidneys to the bladder. They are about fifteen inches long, and in their course from the kidneys to the bladder take the shape of the letter S. They begin at the renal pelvis three and one-half inches apart, but at the point where they turn to enter the bony pelvis they are two and one-half inches apart. As they pass outward along the pelvic wall and approach the ischial spine they reach their greatest point of separation, four inches. As they enter the bladder in front of the vagina the distance between them is nearly two inches. They run obliquely through the bladder-wall for over one-half an inch, and emerge on the interior surface of the bladder about one and one-half inches from each other. The above are my own measurements, being an average of all my dissections on the female cadaver. The duct is S-shaped and tortuous, being much longer than a direct line from kidney to bladder. One can raise a ureter three to five inches from its bed without wounding it. The peristalsis of the ureters keeps them from being closed or compressed by organized exudates. The ureters lie in loose connective tissue close behind the peritoneum almost as far as the ischial spine. At this point they pass through the connective tissue, at the base of the broad ligament, passing under the uterine artery, about one-half an inch from the cervix, along the sides and in front of the vagina. The ureter is one of the best protected ducts in the body.

The arteries of special interest to the gynæcologist are the uterine, the pudic, and the ovarian. The uterine artery arises from the internal iliac; passes to the cervix, supplying it with a thick-walled branch; it then winds spirally up along the sides of the uterus at a little distance from it, and anastomoses with the ovarian artery at the origin of the round ligament—the junction of the tube and uterus. The uterine artery sends off many perpendicular branches to every segment of the uterus; it passes above the ureter, so that in pregnancy the uterus can rise without disturbing the ureter. It is tortuous and spiral, to accommodate itself to sudden or gradual movements, and to carry a large and steady blood-stream on demand. The artery seems to become easily dilated, both locally and generally. This condition favors the growth of myoma.

The ovarian artery arises from the aorta, just below the renal artery, and winds tortuously and spirally to the brim of the pelvis, over which it turns and enters the broad ligament, supplying the tube and ovary, and anastomosing with the uterine artery as noted in the preceding paragraph. The ovarian artery is long because, as man assumed the upright position, the ovary and tube gradually descended from the region of the kidney to the pelvic box. The properties of the ovarian artery are the same as those of the uterine. In myomatous tumors of the uterus one or both ovarian or uterine arteries may be widely dilated, and I have noted this especially on one side in examining *per vaginam* in myoma. Dr. Franklin H. Martin's operation for tying the uterine arteries *per vaginam*, and my own operation for tying the ovarian arteries as they course along the sides of the uterus, are for the purpose of producing atrophy of the myoma by cutting off the blood supply.

The veins of the pelvis are very important, and extend from the vulva to the renal vein on the left and to the vena cava on the right. The veins possess no valves (except at the upper end of the ovarian) and are therefore dangerous when wounded, as uncontrollable bleeding may ensue. Peculiar masses of venous collections exist in connection with the genitals. These bundles of veins are: (*a*) the vaginal bulbs, (*b*) the vaginal plexus, (*c*) the plexus pampiniformis, and (*d*) the bulb of the ovary. These veins are very tortuous and spiral when healthy; when straight and dilated they are in an abnormal condition.

The left-side veins are very long and pass into the ovarian vein, which empties into the renal at right-angles, while the right ovarian vein opens at an oblique angle into the vena cava. Anatomy explains why we find so much more disease in the left tube and ovary than in the right, viz.: (*a*) the left ovarian vein opens at right-angles into the left renal vein—the blood is thus retarded in going around a sharp corner; (*b*) the dilating and contracting rectum irritates the diseased tube, giving it no rest; (*c*) the loaded sigmoid flexure obstructs the venous flow in the left ovarian vein; and my own investigation has demonstrated that (*d*) the left tubal lumen is greater than the right, which is the all-important factor facilitating the progress of infection along the tube.

The most interesting and delicate structure connected with the genitals is the nervous apparatus. This consists of cerebro-spinal and sympathetic or non-medullated nerves. The uterus (body), Fallopian tubes, and ovaries are chiefly supplied by sympathetic nerves, while the vulva, vagina and cervix are mainly supplied by cerebro-spinal nerves.

The sympathetic supply of the uterus, tubes and ovaries is derived from the hypogastric and ovarian plexuses.

The hypogastric plexus originates in the abdominal brain (solar plexus) and passes down along the aorta. It is increased by branches from the lumbar ganglia of the lateral chain of the sympathetic. The combined strands of nerves now pass over the bifurcations of the aorta and sacral promontory, and divide into two large bundles; each of which passes under the peritoneum to the base of the broad ligament, where it reaches the side of the uterus and tubes. Some strands pass to the rectum, but this organ is chiefly supplied by the nerves passing along the inferior mesenteric artery.

The ovarian plexus consists of nerve strands derived from the hypogastric plexus and the ganglia in the lumbar lateral sympathetic chain, and the nerves passing along the ovarian artery. This ovarian plexus supplies the ovaries and the ampulla of the tubes.

At the periphery of the hypogastric and ovarian plexuses are situated small ganglia along the walls of the tubes and uterus, which I have designated "automatic menstrual ganglia." I have attempted to show that these ganglia rule the rhythm of menstruation.

The best method to demonstrate the nerves of the uterus I have found to be the placing of an infant cadaver in pure alcohol for at least six weeks, when the hypogastric plexus can be traced to its home in the body of the uterus as plainly as though it were composed of white cotton threads. The nerves in the infant are much larger in proportion to its size than in the adult.

The cervix and vagina are mainly supplied by branches from the third and fourth sacral nerves. The vulva is supplied by the pudic, which is chiefly composed of the third sacral nerve. The pudic nerve passes out of the pelvis from the third sacral by way of the large sacro-sciatic foramen, winds around the spine of the ischium, and re-enters the pelvis through the lesser sacro-sciatic foramen; it is thus removed from the dangers of the trauma due to labor. The pudic nerve sends branches to the clitoris, to the vulva, to the perineum, and to the rectum.

In teaching I have frequently represented the pudic nerve by the hand. For example: the arm represents the nerve itself; the thumb represents the great vesical nerve just before the pudic passes out of the pelvis; after the pudic has re-entered the pelvis and passed up along the ramus of the pubis, the index finger represents the branch to the clitoris, the middle finger the branch to the vulva, the ring finger the branch to the perineum, and the little finger represents the hæmorrhoidal branch to the rectum. Thus the digits of the hand can vividly represent the branches of the pudic nerve.

It can also be remembered that the pudendal nerve, a branch of the small sciatic nerve, sends branches to the rectum, perineum, vulva, and clitoris which unite with similar branches from the pudic to supply the same organs. There is a wonderful design in the union of the periphery of the pudendal and the pudic nerves.

The lesser sciatic nerve supplies but one muscle (gluteus maximus) and then gives off a branch, the pudendal, which directly supplies the external genitals and rectum. This arrangement of the nerve supply brings the gluteus maximus muscle and the skin of the genitals in direct relations. Irritation of the genitals will induce contraction of this muscle. Thus the gluteus maximus muscle must be considered (anatomically and physiologically) the muscle of coition. Observation on copulating animals will confirm this view.

The essential supports of the uterus are: (*a*) the sacro-uterine ligaments; (*b*) the vagina with its connective and areolar tissue; (*c*) the utero-vesical connection, which consists of about three-fourths of an inch of connective tissue; (*d*) the utero-vesico-pubic ligaments—these are strong bands reaching from the neck of the uterus along the bladder to the posterior surface of the pubes; (*e*) the fascia of the pelvis which fastens into the neck of the uterus; (*f*) the levator ani muscle.

It may be observed that all essential uterine supports are inserted into the cervix. The combination of two essential supports should be noted, and that is the vagina and sacro-uterine ligaments. The vagina reaches from the pubic arch to the cervix, and the sacro-uterine ligaments reach from the cervix to the sacrum (third sacral vertebra). (These ligaments should be called utero-rectal, as they appear to end finally in the rectum.) Now the vagina and sacro-uterine ligaments stretch from the pubis to the sacrum, and constitute a peculiar supporting beam, as noted by Foster. On this supporting beam the uterus rests like a person in a hammock.

The non-essential supports of the uterus I would designate guy-supports. They act like guy-ropes on a mast. There are three of these guy-supports on each side, viz.: the anterior and posterior round ligaments, and the broad ligaments. These ligaments simply steady the fundus. It is well to show that no non-essential support will keep the uterus in position. Alexander's operation is a mere accessory operation and can never assume the rôle of primarily supporting the uterus. If the guy-rope supports do not hold the fundus of the uterus in position—*i.e.*, if the round ligaments (anterior and posterior) allow the uterus to fall backward—they indirectly allow it to descend by changing its right-angled relation to the vagina to a position of parallelism. Then the cervix acts as a wedge, and intra-abdominal pressure gradually drives it out at the vulva.

A careful study of structure and function of the pelvic organs will enable one to state fairly that the use of the knee-and-elbow position is quite limited in gynæcology. Observation thereon should be based on an understanding of intra-abdominal pressure, which is simply muscular tension. Any movement of any part of the abdominal wall must have its effect on the positions and relations of the viscera.

A short summary regarding the position of the uterus may be useful at this point. The views here presented have been gained from at least seven thousand examinations of the living subject, from scores of autopsies, and from ten years of gynæcological study and work in our own and other countries.

The uterus has no definite, fixed position. It changes according to the direction and force of intra-abdominal pressure. The uterus moves with every step and every respiration; its position varies with the filling and emptying of the bladder and rectum. The normal uterus is continually making excursions about the pelvis and returning without losing its integrity. A normal uterus, with the woman standing, bladder and rectum being empty, lies horizontal to the plane of the earth. A displaced uterus is one permanently out of position, its chief characteristic being immobility, or fixation. The cause of immobility may lie in the uterus itself or outside of it.

A fixed uterus may be said to be displaced, even though it is in exactly the normal position. The uterus may remain out of place because of either shortening or elongation of some of its supports. The whole definition of a displaced uterus must rest on anatomico-pathological grounds. A uterus temporarily out of place is not dislocated. Fixation is the characteristic of uterine displacement.

In anteflexion of the uterus, that organ is curved on its anterior surface and abnormally fixed; the immobility may be in the uterine walls or outside. In anteversion the uterus lies extended forward and is abnormally fixed; the immobility in this case generally lies in the uterus itself—it is inflammation that has stiffened and straightened it out. In retroflexion the uterus is curved on its posterior surface and abnormally fixed. In retroversion it lies extended toward the rectum and is abnormally fixed. The immobility in the latter case is often due to metritis which has made the uterine wall stiff and hard.

The especial factor in anteversion and anteflexion must be sought in the sacro-uterine ligaments; if these are shortened, the cervix is drawn abnormally toward the sacrum. This condition allows intra-abdominal pressure to exercise excessive force on the posterior surface. In versions especially we must look for metritis, *i.e.*, causes in the uterus itself. In flexions we may frequently look for the causes outside of the uterus, especially contraction in the sacro-uterine ligaments in anteflexion, and elongation of the same in retroflexion.

Naturally the uterus is turned toward the right. This is well illustrated in an infant cadaver; if placed in alcohol for a month and then carefully opened, the right horn of the uterus will be found nearer the sacrum than the left. This is uterine torsion. The frequent dislocation toward one or the other side is due to contraction of the broad ligament as a consequence of peritonitis.

A uterus is dislocated when it is outside of the vulva, just as much as if it were bound down by adhesions. In one case the uterine supports are shortened, in the other they are elongated.

To prepare material for profitable dissection in the pelvis and abdominal viscera, one should select a recent, young, spare female cadaver. It should be well injected with the modern preservative fluid. The arteries should be moderately filled with red matter, and the veins slowly and gently filled with a blue substance. A force which will rupture either vein or artery must be avoided, and the vessels are better if not very full. Slow and careful dissection will enable one to demonstrate the main branches, ganglia, plexuses, and distribution of the sympathetic nerves. However, the best method of demonstrating the sympathetic is to preserve an infant cadaver of from six to ten months in alcohol several months, when the nerves may be easily traced out. The pelvic nerves, sacral plexus and pudic nerves are best dissected by separating the sacro-iliac joint and sawing through the pubic and ischial ramus at the obturator foramen. By this method the beautiful connections and relations of the pudic nerve with the pudendal nerve, a branch of the small sciatic, can be observed. The experiment of filling and emptying the bladder and rectum is very instructive as regards the positions and relations of the pelvic viscera.

The *peritoneum* is so important to the gynæcologist that I will devote a short space to its anatomy and pathology at this point. The peritoneum is a serous membrane similar to the pleura, pericardium, and synovia. If one will imagine the empty abdominal cavity lined with peritoneum, and the viscera gradually growing from the dorsal wall, pushing the peritoneum before them until they fill the cavity, a good view of the peritoneal relations will be obtained. The peritoneum is a great lymphatic sac. It forms supports to organs by anchoring and holding them in distinct relations. The supports are called *mesenteries*, for intestinal supports; *ligaments* for the support of more solid organs; and *omenta*, connecting the stomach to some other organ.

The peritoneum consists of two diverticula—a lesser and a greater bay communicating with each other through the foramen of Winslow. All organs lie outside the peritoneum. It is a closed sac superimposed on the viscera and tucked in between and among the visceral folds. In woman an anatomical peculiarity exists, namely, the two openings in the peritoneum for the transmission of ova; the mature egg breaks through the folds of peritoneum which cover the ovary, and the Fallopian tube opens into the peritoneal cavity in order to secure it for carriage to the uterine cavity, so that the ovum really passes through both peritoneal layers to reach the uterus. It is this unique connection of tube to serous cavity, of continuation of mucous membrane with serous membrane, that constitutes the peculiar liability of the female to local peritonitis. The pelvic peritoneum is peculiarly loose. It rests on the pelvic organs in the centre, but on each side it rests on soft, white areolar tissue. If one begins at the posterior pubic surface to trace the peritoneum, it will be found to pass over the front of the bladder, its fundus and posterior surface, and at the junction of the uterine body with the cervix to pass on to the uterus, over its fundus, and to the posterior surface of the vaginal wall. Before it is reflected on the uterus, forming Douglas's pouch, the peritoneum passes from the sides of the uterus in a double fold toward the bony wall; this constitutes the broad ligaments, which contain in their folds on each side the tubes, ovaries, arteries, veins (plexus pampiniformis), lymphatics, nerves, muscles, and connective tissue. The broad ligament is a bed or support for the above-named structures. Across the base of the broad ligament runs the ureter.

The relations of the peritoneum are much altered after labor.

I have found the pelvic peritoneum thicker in women than in men.

The use of the peritoneum is:

(*a*) To prevent friction of moving viscera.

(*b*) To anchor and support the viscera in proper relations.

(*c*) To prevent the invasion of infection by throwing out barriers of exudates; to protect wounded viscera.

(*d*) To furnish the viscera with an elastic covering.

The peritoneum seems to be as necessary as the brain, and subserves an equally great function in life.

In the abdominal cavity there exists a great fold of peritoneum known as the omentum. It acts as the great protector from infectious invasion. It will actually heal wounds. It is like a man-of-war which is ready at any time to move to attacked points, wherever infection invades the peritoneal cavity; at the appendix, gall-bladder, or tubal ends, the omentum stands ready to circumscribe the infectious invader. It corrals the enemy of the peritoneum with exudates.

The peritoneum is liable to inflammation—*peritonitis*. The infection must generally attack the peritoneum from the inside, for it withstands very much infection and trauma from the outside without apparent inflammation. One of the chief essentials of peritonitis (after infection) seems to be that the epithelium must be denuded to start the infection, *i.e.*, there must be sufficient trauma to break off the flat serous epithelium in order to give a growing medium for the pathogenic microbes. Pathogenic microbes can, it is true, be injected into a healthy peritoneum without causing peritonitis, but in contact with denuded epithelium these infectious agents give rise to violent peritonitis. Laparotomy is just the process to furnish all the required trauma to denude the delicate epithelium. With the shingles torn off a roof, it will leak; and similarly, with the shingles of flat epithelium torn from the peritoneal surface, it affords ample opportunity for the invasion of pathogenic microbes. Trauma leads the way to peritonitis.

Peritonitis always begins locally. The two sexes seem to suffer from it to about the same extent, though from different causes. Man has much more hernia than woman. Woman has much more pelvic peritonitis, or peritonitis at the ends of the tubes; but man has four times as much appendicitis. Man has more volvulus, but woman is afflicted much oftener with derangement of the gall-bladder.

Peritonitis arises at the following points:

(*a*) At the ends of the Fallopian tubes, where infection passes into the peritoneal cavity. This is the most common localization of the affection designated "pelvic peritonitis."

(*b*) At the hernial openings. This occurs some three or four times as often in man as in woman. The peritonitis arises from irritation or strangulation of the gut in the hernial opening, thus allowing the passage of pathogenic microbes through the gut-wall to the peritoneum, inducing local peritonitis.

(*c*) At the appendix. Perforation of the appendix induces local peritonitis by the escape of pathogenic microbes. This form of local peritonitis is four times as frequent in man as in woman. In short, peritonitis in men or boys should be looked on as appendicitis until otherwise proven.

(*d*) At the gall-bladder. Perforation arises and peritonitis follows. This form is four times as frequent in woman as in man. About one-third of all the autopsies I have made on women above forty-five have shown local peritonitis around the gall-bladder.

(*e*) At the pylorus (sphincter) the peritonitis chiefly arises from malignant invasion.

(*f*) At the ileo-cæcal valve (sphincter). This is rare.

(*g*) At the anus (sphincter), peritonitis is not infrequent. It occurs oftener in woman than in man, on account of the more frequent occurrence of stricture in the female rectum.

(*h*) At the hepatic flexure.

(*i*) At the splenic flexure.

(*j*) At the sigmoid flexure the friction of fæces abrades the mucous membrane, thus allowing the pathogenic microbes to pass through the gut-wall, where they induce peritonitis around the flexure.

(*k*) At any point where infection may invade the peritoneum, *e.g.*, perforation of the alimentary canal, the genital tract, or urinary passages, allowing infectious matter to pass into some part of the peritoneal cavity.

Generally, abdominal tenderness means peritonitis, which has started from some infectious focus.

The exquisite tenderness found in the distinct locations of large tumors is generally local peritonitis, which I have demonstrated time after time in section. The severe tenderness in parts of the pelvis is generally peritonitis induced by infectious matter escaping from the tubal ends. The local peritonitis may be recent and very tender, or old and not acutely tender but still giving on all active motion a dull, sickening, aching sensation from old adhesions. The adhesions may persist and induce these dull pains for many years, especially in child-bearing life, as monthly exacerbations occur.

Satisfactory recoveries after section, when the adhesions have been broken up, show that the adhesions were the cause of the protracted illness. The adhesions seem to irritate the nerves by pinching and compressing them; they disturb circulation by congestion or anæmia of the parts and by drawing viscera out of normal relations. It may be observed that when the visceral peritoneum is involved only, the pain is of a dull character—only the sympathetic nerves are attacked,—but when the parietal peritoneum is involved, the spinal nerves as well as the sympathetic are involved and the pain assumes an acute, lancinating character. Pain which involves the sympathetic is dull, while that which involves the cerebro-spinal nerves is sharp and lancinating.

Peritonitis may be described in its various forms as:

(*a*) *Progressive fibrinous peritonitis.* This is where exudates and adhesions play the rôle. With new exacerbations new exudates arise; so that many centres of septic foci may be circumscribed. Such pent-up collections of pus may be separately opened without communicating with each other or with the general peritoneal cavity.

(*b*) *Diffuse suppurating peritonitis.* Nearly all such cases are rapidly fatal.

(*c*) *A so-called dry form of peritonitis.* In some two hundred autopsies on dogs, but few cases of dry peritonitis were found. The disease slowly progresses over the peritoneum.

(*d*) Another form, called *intestino-peritoneal septicæmia*, exists. It may depend on ptomaines or microbes.

Man has relatively the least amount of peritoneum of any animal. The folds of peritoneum are more ample and extensive in all animals which I have examined, as the horse, dog, pig, coon, cow, monkey, sheep, and so forth. The different animals vary in their susceptibility to peritonitis. The horse has a peritoneum so susceptible to infection, and peritonitis with him is so fatal, that equine abdominal surgery is scarcely possible in the present state of surgical knowledge. The dog's peritoneum is comparatively the same in extent as man's. The pig is not very susceptible to peritonitis. It is well shown in spaying cows that these animals do not possess a very delicate peritoneum.

At this point I wish to make a few remarks on the anatomy, physiology and pathology of the SYMPATHETIC NERVE, showing the principal points in gynæcology relative to the abdominal brain. A short time ago a learned gynæcological professor said to his large class that he could talk by the hour on the sympathetic nerve, but the truth is we know nothing about it. Is there not high need for study on this subject? I will here present some original investigations on the sympathetic nerve, which I have worked out during the last five years. The claim is that the ganglia of the sympathetic nerve are little brains, *i.e.*, they receive sensation, send out motion, and control secretion. They are trophic centres, and possess vasomotor power. They are centres for reflex action, and are endowed with a peculiar quality called rhythm.

The great reorganizing centres in the sympathetic nerve are the abdominal brain (solar plexus) and the three cervical ganglia. Reorganizing power of a less degree exists in the lateral chain of ganglia situated on the circumference of the elliptical-shaped sympathetic and in the collateral ganglia in the chest, abdomen, and pelvis, and also in the ganglia situated in every viscus (which I have designated automatic visceral ganglia).

The sympathetic nerve consists of two lateral chains of ganglia extending from the base of the skull to the coccyx. Situated anterior to these chains are two collateral plexuses known as the cardiac and abdominal. Besides these there exist in all the viscera small ganglia (automatic visceral ganglia)—for example, the automatic hepatic, cardiac, and menstrual ganglia.

The distribution of the sympathetic nerve is (*a*) to blood-vessels, (*b*) to glands, and (*c*) to viscera. It is connected with the cerebro-spinal nerves by the rami communicantes. Its independence of the cerebro-spinal axis is not yet fully settled; but children have been born at term with no cerebro-spinal axis. The part of the sympathetic that appears to be most independent of the cerebro-spinal axis is that supplying the uterus and the digestive tract. I have kept the intestines of dogs in active peristaltic waves for nearly two hours after death, in a warm room, by tapping them with the scalpel.

The automatic parts of the sympathetic to which I wish to direct attention are the cervical sympathetic ganglia (superior, middle, and inferior) and the abdominal brain (the solar plexus). Due consideration must be given to the three splanchnic groups: (1) the cervical splanchnics, conducted to the stomach, heart, and lung through the spinal accessory and the vagus; (2) the abdominal splanchnics, originating from the fourth dorsal to the second lumbar, and running to the abdominal brain; (3) the pelvic splanchnics, conducted to the hypogastric plexus by means of the second and third sacral nerves, to supply the rectum and the genito-urinary organs.

I have observed for some time that the connection of the genital and urinary systems with all the great nerve-centres is intimate and very large. For example, the organ which has the most intimate and profound connection with the cerebro-spinal axis and the abdominal brain is the uterus. The eye, too, is closely connected with both nervous systems and also with the uterus. This intimate nervous connection of the uterus with the nervous system increases with the ascending scale of animal life.

The physiological function of the sympathetic nerve is rhythm. The sympathetic nerve alone possesses this function; the power to produce a rhythm belongs only to a ganglion. The viscera functionate rhythmically. The destruction of this periodical function causes disease. The organs which have the most pronounced rhythm are those most intimately connected with the abdominal brain; chief among these, as I have already said, is the uterus. So far as I can observe, the uterus is connected with the abdominal brain by twenty or thirty strong nerve strands.

1. The uterus and tubes have a monthly rhythm, due to the automatic menstrual ganglia situated in their walls. No doubt the higher physiological actions originate in the great abdominal brain. The breaking of the rhythm of one viscus disturbs the rhythm of all the rest; this is in no organ so significant as in the uterus.

2. The liver has a visceral rhythm, through its automatic hepatic ganglia, similar to that of the uterus. When new food arrives in the liver from the portal vein, the cells of the liver begin to swell, in the performance of their function of making bile, glycogen, and urea. The hepatic capsule (Glisson's) and the peritoneal covering being extremely elastic, the liver can go through its rhythm whenever occasion arises When the liver arrives at the maximum point of the rhythm, the cells have exhausted themselves in making bile, glycogen, and urea; these three products are sent home, and the cells begin to contract, Glisson's capsule begins to shrink, and the peritoneum closes back to its original state. Then the liver gets rest and repair, in order to be able to accomplish the next rhythm. It is the breaking of the hepatic rhythm by bad food or distant reflexes of diseased viscera that causes disease in the liver. The most prominent organ that induces irregular hepatic rhythm is a diseased uterus. Alcohol taken without food destroys the nice balance of the hepatic rhythm by falsely alarming the liver to go through its rhythm without due stimulus or by unnatural stimulus.

3. It is plain that the heart goes through a rhythm by means of the automatic cardiac ganglia situated in its walls. These ganglia are known as Bidder's, Schmidt's, Remak's, and Ludwig's. The vagi (especially the right) give the heart its slow, steady beat, its sober, regular movements like a

pendulum; but the three cervical sympathetic ganglia rule the heart in regard to rapidity and irregularity. It is the breaking of the cardiac rhythm that causes reflex heart troubles. A diseased uterus is preëminently the organ that disturbs the heart in its rhythm.

4. The digestive tract has its own special rhythm through Auerbach's and Meissner's plexuses—the one presiding over peristalsis, and the other over digestive secretions. The occasion of a digestive rhythm is food. The main rhythm occurs in the small intestines and the stomach.

5. The bladder goes through a rhythm by means of its automatic visceral ganglia; it has a diastole and a systole. The rhythm of the bladder is broken when its nerves are dragged on, as in pregnancy.

6. The spleen performs its rhythm by its automatic splenic ganglia. The occasion of a splenic rhythm is fresh food. The spleen accomplishes its rhythm by (*a*) the swelling of its tufts and substance, (*b*) by the expansion of its elastic capsule, and (*c*) by the stretching of its peritoneal covering. It rises to a maximum and sinks to a minimum. It is now in action and now in repose.

Thus each viscus performs its peculiar rhythm by means of the automatic ganglia situated in its substance. The higher physiological orders of the abdominal brain must, of course, be obeyed.

We now come to the consideration of diseased viscera. Pathogenesis through the sympathetic, in health and disease, is by reflex action. Of course we have ganglionic sclerosis, recognizable and non-recognizable lesions of the sympathetic, pigmentation and secondary diseases, etc.; but the great pathology of the sympathetic nerve in gynæcology is the transmission of reflexes from diseased viscera.

We will take for illustration a case of uterine cervical laceration occurring five years ago; the patient is now a pale, anæmic, neurotic woman, unfitted for the labor of life. A lacerated cervix is soon followed by endometritis. Irritation from this is transmitted over the hypogastric plexus to the abdominal brain, where it is reorganized. It should be remembered that while any irritation (force, vibration) will travel on the lines of least resistance, and the direction of least resistance from the abdominal brain is toward that organ having the greatest number of nerve strands, yet the irritation, reorganized, will flash out on all the plexuses. Reaching the liver, it will disturb the hepatic rhythm, causing an over-production, an under-production, or an irregular production, of bile, glycogen, and urea; and finally the functions of the liver suffer impairment. Suppose we follow this same uterine irritation to the digestive tract. At Auerbach's plexus it will cause colic, lethargy, or fitful peristalsis, and at the plexus of Meissner it will induce diarrhœa, constipation, or development of gases — fermentation. These disturbances, after a painful progress of from six months to two years, culminate in indigestion. Then comes malnutrition, which results from long-continued indigestion. The third stage is anæmia from malnutrition. The fourth stage is neurosis; the ganglia have been long bathed in waste-laden blood.

Hence endometritis may induce (*a*) indigestion, (*b*) malnutrition, (*c*) anæmia, and (*d*) neurosis.

Again, take the heart palpitation at the menopause. It can be explained by reflex action. The child-bearing period of woman is thirty years. During that time regular monthly forces have been transmitted over the hypogastric plexus to induce uterine and tubal rhythm. Now, at the menopause, the hypogastric plexus degenerates and will not carry the forces, which consequently accumulate. The accumulated forces in the abdominal brain go up the splanchnics to the three cervical ganglia, where they are reorganized and flashed out to the heart, causing it to work either too rapidly or fitfully. This explains palpitation at the menopause.

Exactly the same explanation suffices for liver disease during this period.

At the menopause the heat and sweat centres are irritated, and the woman has flashes of heat and "spells" of sweating.

Pigmentation is also from reflex action; the irritation spending its main force on the liver and the spleen, causes pigmentation.

THE SECOND LANDMARK IN GYNÆCOLOGY—MENSTRUATION.

Menstruation is a rhythmical or periodic function of the uterus and Fallopian tubes. Among the lower animals menstruation and ovulation are concomitant, but as the scale of life ascends they become separate processes. Man and monkey are probably the only animals with a distinct rhythmical or periodical menstrual discharge independent of ovulation. This process in lower animals is called œstrus, or "rut." Menstruation is limited to a certain period of life—generally from the fifteenth to the forty-fifth year. The significance of menstruation we do not understand. I shall treat of it as due to small nerve ganglia situated in the walls of the uterus and tubes. It is a manifestation of the nervous system. It must be remembered that a nerve ganglia is a small brain; it receives sensation and sends out motion; it assimilates food, and is a trophic centre; it reproduces itself, and controls secretion and vermicular action; it is a physiological centre, and has all the elements of a brain. These little ganglia, situated along the uterus and tubes, pass through the monthly rhythm, rising and sinking between the extremes of functional activity and repose, and corresponding in these states to the menstrual congestion and intermenstrual quietude of the uterus and tubes. The tubes at the monthly periods assume peristaltic motion, a vermicular or tortuous action, so that an ovum may be carried to the uterus by their movements. It may be observed that when the ganglia along the tubes are in the slightest action, the tubes become filled with fluid secreted from the blood, which is whipped in a stream toward the uterus by the cilia that always move in that direction. This tubal fluid furnishes a canal in which the ovum can float to the uterus; for in a dry, contracted tube, an egg could only pass with difficulty. The automatic menstrual ganglia are similar to the other visceral ganglia, such as the cardiac and those of the digestive tract, and the renal ganglia. The term "automatic menstrual ganglia" was introduced by me several years ago, and represents my views as to the mechanism of menstruation.

Since I consider ovulation a separate and continuous process (whose rhythm we have not yet detected), it may be well to note a few points in regard to its results. The remnants of ovulation are yellow bodies — the corpora lutea—of all grades and sizes. But after considerable investigation with the ovaries of human beings and the lower animals, I formed the conclusion that the corpus luteum is no sign of pregnancy. To elevate the corpus luteum into a judicial tribunal as evidence of pregnancy, is simply following erroneous authority. We do not yet understand the life duration or signification of a corpus luteum. I have seen corpora lutea in cows which appeared almost exactly identical, though the period which had elapsed since labor varied from seven to twenty months. It must be stated that generally the corpus luteum is larger when it follows pregnancy.

There are four questions to ask in regard to menstruation.

1. *At what age did menstruation begin?* This is important, as it has to do with precocious or deficient genital development. The girl who begins to menstruate at twelve years of age, generally has profuse menstruation and is apt to have subsequent disease, as chlorosis and menstrual disorders. She who begins at eighteen suffers generally with dysmenorrhœa, and is very often sterile; the development of the genitals is deficient. The prognosis as regards sexual life in these cases is that of pain and sterility. Early menstruation generally means precocious genital development, late menopause, profuse flowing, disordered menstruation, and chlorosis. Late menstruation generally means deficient genital development, painful and scanty menstruation, and sterility.

2. *Is menstruation regular?* It requires an average of eighteen months for menstruation to become regular after the first period. Many girls with weak nervous systems have irregular menstrual flow for years. The fleshy girl is prone to irregular menstruation, and the tubercular patient suffers likewise. In such girls the automatic menstrual ganglia are deficiently developed; they are unable to initiate and sustain the menstrual rhythm. These patients are

extremely nervous about their condition, and are continually seeking remedies, which, as a rule, fail them.

3. The third question of significance in regard to menstruation is as to *the quantity of blood discharged at each period.* This is difficult to estimate, as so much depends on the sentiments and habit of the women. Some change the napkins several times a day, while others change them but seldom. If more than three napkins are used daily for more than four days, it may be considered profuse menstruation. Menstruation was doubtless never originally intended to get rid of blood; to me it seems that the loss of blood at menstruation is a detriment to the woman. However, many women lose much blood at the periods and still remain healthy; but that is simply because they are endowed with good, robust constitutions. If a woman with a weak constitution loses blood freely at the periods, she soon manifests exhaustion. A woman should menstruate once a month, with an average of four days flowing, and an average discharge of four ounces. Absence of menstruation is known as amenorrhœa. Menorrhagia indicates a too profuse flow at the period, while metrorrhagia means a flow outside of the menstruating period.

4. A very important question in regard to menstruation is *pain.* Natural menstruation is not painful; when pain is present the condition is known as dysmenorrhœa. Painful periods are disordered menstruation, and indicate pathological conditions. A

feature in regard to painful menstruation is that it soon deteriorates the health. Dysmenorrhœa generally depends on endometritis and metritis, especially the latter. Sims was the author of the idea that dysmenorrhœa is of mechanical origin. This view obtained wide recognition, but I believe the theory is erroneous. If a patient who is subject to severe dysmenorrhœa be placed on the table while she is in the most severe menstrual pains, and a sound be passed into the uterus, no blood will follow it. The uterus is empty. But just as soon as the menstrual discharge becomes freer, the pain is less severe. Young and sterile women are the ones who suffer from painful menstruation. Dysmenorrhœa is nearly always in the beginning of the menstruation, before the flow is established. The general and basic cause of dysmenorrhœa is metritis. During the menstrual rhythm the uterus becomes congested and swollen; blood tends with vigor toward the uterus. As the blood-vessels of the uterus expand, the sheath of the nerves in the inflamed (metritic) uterus is pressed on, and this induces pain. Congestion in any inflamed tissue causes pain. As soon as the distended and congested blood-vessels obtain relief by depletion, the pain ceases rapidly. No doubt the reason that the theory of mechanical dysmenorrhœa obtained so wide acceptance is because the pain resembles labor pains. The woman bemoans that the uterus cannot expel the blood clot. She has found out by experience that as soon as the flow begins she gets relief. Dysmenorrhœa, then, is due to a pathological condition of the uterine walls. For ages dysmenorrhœa and sterility have had a popular connection. But the sterility does not depend on the dysmenorrhœa, but on the metritis (endometritis) which is the cause of the pain. An endometritic and metritic uterus is not in a condition for gestation; abortion generally cuts the latter short, though conception itself is not frequent among such patients. Again, anteflexion, dysmenorrhœa, and sterility are frequently found associated. But while the sterility depends on the metritis which induces dysmenorrhœa, the anteflexion is directly dependent on the inflammatory state. The pathological tripod (anteflexion, dysmenorrhœa, and sterility) rests on inflammation (metritis).

Hence the four salient questions in menstruation are regarding the age of puberty, the regularity and the amount of discharge, and the pain.

It may be asked, how does a young woman acquire endometritis and metritis which causes dysmenorrhœa? Excluding a gonorrhœal origin, the answer is: By (*a*) stagnation of secretions; (*b*) the opening up of the passage by the menstrual discharge; (*c*) the dust from the atmosphere and infection from the clothing; (*d*) manipulation or masturbation; and (*e*) from disturbed secretion by reflex action, as, for example, in rectal pressure.

In my clinics I have noticed three classes of patients, with regard to menstruation, viz.: (1) the girl with the precociously developed genitals; (2) the one with deficiently developed genitals; and (3) the fleshy and tubercular girl with irregular menstruation. The first class are precociously developed in general, but especially in the genitals. They begin to menstruate early. In the beginning they flowed profusely and regularly, but as time went on they soon became irregular and scanty in their menstruation. They soon became chlorotic, though such girls are often plump and good-looking. They have what Mr. Tait calls "adolescent anæmia." Defective blood and malnutrition soon become manifest. They complain of breathlessness and palpitation. One can hear heart murmurs, on physical examination. They have œdema and a pale countenance. Such chlorotic, anæmic girls generally live in the large cities. They are a product of defective living in crowded towns. Few are found in the country, for residence in the country, with rest, will generally cure them in a year.

Premature genital development may be considered the cause of the trouble among such girls. Even when they are very anæmic they will frequently become pregnant, though their menstruation is irregular. Their lymphatic glands are well developed and well padded with fat. The sympathetic nervous system seems well (and probably too well) developed, but it does not maintain its early, precocious vigor.

These girls complain of constipation and irregular appetite. They are breathless because the red blood-corpuscles which carry oxygen are deficient in relation to the other blood constituents, white corpuscles and plasma. It might be said of such girls that their blood-vessels are too full—that they are excessively vascular. But whether their headaches and eye-troubles are due to anæmia or to congestion of the brain, is so far unsettled. It seems probable that modern civilization is responsible for most of the chlorotic, anæmic girls. This class have a late menopause. They generally recover from menstrual disorders before the age of twenty-five.

The second class of disordered menstruation represents deficient or arrested development. They begin to menstruate late, say at seventeen or eighteen years of age. The commencement of the flow is frequently painful. The pain is probably due to endometritis or metritis. The menstrual discharge is frequently irregular, scanty, and lasts but a few days. The genitals are frequently defective or very small. In this class is found the infantile uterus. These girls are not apt to become pregnant. They have a premature menopause. They are always in trouble, and therapeutic measures generally fail to relieve. Some pathological process, embryological or post-natal, has caused deficient genital development and made them a burden to themselves and useless to society.

A third class of disordered menstruation is found in fleshy and tubercular girls—both subjects of debility, the nervous system having been so burdened by degraded fat or exhausted by the irritation of tubercular bacilli that it cannot initiate and sustain regular menstrual rhythms.

In general considerations of the menstrual function, we may conclude that menstruation is a nervous phenomenon. It is a reflex act, originating in the mechanism of the nervous system. But we must have a normal genital apparatus, a normal nerve apparatus (automatic menstrual ganglia), and a normal blood-supply. The rhythm of menstruation belongs to the sympathetic nervous system. This system is distributed to the blood-vessels, the glandular system, and the viscera.

Hence, in the menstrual rhythm the vascular system will be affected. The cardiac ganglia, I think, share activity with the automatic menstrual ganglia as well as all other visceral ganglia. Arterial tension is augmented and the rhythm of the pulse is stronger. The whole arterial system is disturbed, as may be noted in paling and blushing, in cerebral congestion and anæmia, in dizziness and headaches.

The whole glandular system is stimulated; the lymphatics are more distended; the digestive, bronchial, sudoriferous and vulvar glands secrete more actively, producing, for example, a diarrhœa or an odor from the vulvar glands. Pigmentation is increased around the eyes, on the nipples, on the genitals, and on the face and neck, the region supplied by the fifth nerve. This nerve has six sympathetic ganglia, which explains the facial acne during menstrual life. The viscera are also disturbed in function. Every viscus has its own automatic nervous ganglia, and, so far as I can observe, most of the viscera share in the disturbance of any one viscus by reflex action. Hence in menstruation one can observe the automatic renal ganglia, the digestive (Auerbach's and Meissner's plexuses), cardiac and hepatic ganglia sharing in the maximum physiological activity of the automatic menstrual ganglia. In general the glandular system, the vascular system (artery, vein, and lymphatic channels) and the visceral systems are all stimulated by the setting in motion of the automatic menstrual ganglia. The maximum point of rhythm in the automatic menstrual ganglia induces rapid physiological activity among all the other automatic visceral ganglia. The voice and the tonsils share in the menstrual rhythm. The centres of the cord and brain are under a state of tension ready for any physiological disturbance. Fright and emotion will interrupt, even for long periods, the automatic menstrual ganglia, and prevent their regular rhythm. In pregnancy and nursing, the menstrual rhythm may be so feeble that the weakened peristalsis is unable to float an egg through the tube, from lack of secretion, and thus no discharge is produced.

The source of the menstrual discharge is from the uterus and tubes. My authority for this assertion comes from the study of the tubes of animals during œstrus or rut, and of human tubes at menstruation, while the woman is approaching the time of the flow or emerging from the menstrual rhythm. This I have had opportunity of observing frequently—both in my own operations and in witnessing the operations of others, especially of Mr. Tait.

Several years ago I presented some views on the subject of contorted, spiral or convoluted Fallopian tubes. In many women I have observed peculiarly twisted tubes, and sometimes I have found a band of tissue running along the upper border of the tubes. This band I have named *Tænia Tubæ*. It is much shorter than the tube itself, and resembles the bands along the colon known as tænia coli. These twisted tubes are the result of arrested development. In the fœtus the tubes lie coiled and spirally twisted. All the animals which I have examined—man, ox, cow, sheep, dog, pig, and horse—had tortuous or twisted tubes in fœtal life. These peculiarly contorted and twisted tubes may be a reversion to fœtal life, a return to early existence.

I have stated that the tube is made up of two muscular layers. The circular layers do not engage so much in gestation, and probably not in menstruation, as the longitudinal layers. Now, when gestation is completed, the longitudinal muscular layers of the tube involute irregularly; they have subinvolution, and the result is convoluted, twisted tubes.

The general deduction which I wish to draw from the above statements is that pre-menstrual pain is frequently tubal colic. When the tubes are stimulated they go through a peristalsis similar to that of the intestines, and are capable of producing colic just as are the latter. When the tubes are diseased and become irritated into peristaltic movements, they produce a dull, aching, sickening pain. I have seen this tubal colic last from one to two hours after a digital examination. It is not unfrequently caused by coition, and is then called dyspareunia. In short, irritation of the automatic menstrual ganglia will induce tubal peristalsis; and should the tubes be diseased, pain is liable to arise.

The treatment of menstrual disorders depends entirely on the causes and existing conditions. The causes may be general or local. The general or systemic causes are: profound impressions on the constitution, as tuberculosis; excessive fat; exhaustion; change of climate; lack of nervous energy, etc. Such general causes demand general treatment. Debilitated women often cease to menstruate—nature saves them from losses—but returning health re-establishes the menstrual rhythm.

The local treatment most concerns the gynæcologist. It may be noted that many menstrual disorders begin at the menstrual rhythm and gradually increase.

Rest (in bed) at the menstrual period is the most applicable and valuable therapeutic measure known. A few days of quietude at the monthly rhythm is the prophylaxis which saves many a woman from being an invalid.

In regard to amenorrhœa—absence of the menses or a very scanty appearance—we have no known drug which will restore the flow. Emmenagogues vanish under analysis. Iron and manganese enjoy to-day the widest favor as stimulants of the pelvic organs. In my experience iron congests the pelvic organs to a considerable extent, and should be avoided in genital hæmorrhage and inflammations. In electricity we possess one of the best uterine stimulants. If a girl is not disturbed in her general health by the amenorrhœa, it is frequently good treatment to let her alone, for often the uterus is of an infantile character, and nearly all therapeutics fail in such cases. Intra-uterine pessaries are dangerous, as they nearly always end in endometritis and salpingitis.

As to the dysmenorrhœa, it generally depends on an inflamed uterus and tubes, and treatment must be directed to subdue the inflammation. The two most effective remedies in uterine and tubal inflammations are the hot vaginal douche and the glycerin tampon. The douche should be given from a fountain syringe while the patient lies on her back. A large pail with a rubber conducting-tube from its lower end makes the cheapest and best apparatus. The douche should be started with a pint of warm water for a young girl, and two quarts for a married woman, and the quantity and heat should be daily increased until a pailful twice or thrice daily can be used. I use for every gallon a large handful of salt (NaCl) and a heaping teaspoonful of alum. It should require from twenty to thirty minutes to take a large douche. The effects of the douche are to contract the uterine and ovarian arteries, to contract the genital veins and restore them to their original tortuosity, to contract the lymphatics, to contract the genital tissue about all the vessels, to prevent the vascular stasis, and to shorten elongated genital supports. The douche can be raised to 120° F. The glycerin tampon should be applied two or three times weekly; it is hygroscopic and depletes the genital and pelvic fluids. The tampon and douche tend to restore to the genitals their normal tone.

Menstrual disturbances are only symptoms of disease. When, at the menses, the temperature rises and there is pelvic tenderness, I believe it is frequently due to the leakage of infectious matter from the tubes into the peritoneum. The matter was harmless while in the tubes, but on the peritoneum it becomes a source of disease.

Many young women suffer from endometritis due to stagnant secretions, the entrance of infection at the monthly period or as a consequence of manipulation or masturbation, the entrance of dust, or the rubbing of soiled clothing. Uterine dilatation and irrigation with boiled water is often an efficient remedy. General tonics, hydro-therapeutics, fresh air, and exercise, along with the douche, may induce healthy and painless menstruation.

I am opposed to examining young girls for slight and transient troubles, but if symptoms justify interference a thorough examination should be made and the necessary medical or surgical methods followed. All existing conditions should be investigated and all discoverable causes removed if possible. Diet should be regulated. If constipation exists, it should be corrected; a very simple and efficient plan is to have the patient drink, every night on going to bed, a glass of water containing from a quarter to a teaspoonful of epsom salts, following with regular evacuations of the bowels after breakfast every morning; hot coffee at the close of the morning meal stimulates bowel peristalsis and aids defecation. The bladder should be regularly emptied. A full bladder or a full rectum greatly influences the position, as well as the circulation. of the uterus.

Occasionally young women have a cessation of the menstrual flow for a few months, though they may have been quite regular for years. Such cases frequently complain of a peculiar illness. There is an old tradition among the laity that the menstrual blood is poisonous, but this is without the least known foundation. Still it may be a question whether auto-intoxication may not arise in menstrual suppression.

The so-called hystero-epilepsy, or menstrual epilepsy, has attracted much attention of late among gynæcologists. It is generally recognized that when women have convulsive seizures simulating epilepsy, all the convulsions are exalted at the time of menstruation, and that in most cases menstruation is deranged. Cases of mild menstrual neurosis not infrequently pass through one's practice, but severe menstrual neurosis is rare. I have seen no permanent benefit from drugs in such cases. Operative procedures sometimes afford relief. The worst case I ever observed carefully was under the care of Dr. Lucy Waite; the patient was less than twenty-two years old and had suffered from severe menstrual neurosis for six years, becoming steadily worse until she required an attendant some ten days during every menstrual period; she was violent in action and was the subject of the most extraordinary delusions and hallucinations, and had at her periods dozens of convulsions absolutely simulating those of epilepsy. She was abandoned by her relatives and her guardian. After a consultation it was decided, as a last resort, to remove the tubes and ovaries. The patient made an excellent recovery, and ten months afterward we received a letter from her guardian stating that the patient was well and had gone to work. This was one of the most remarkably successful cases I ever observed. The "fits" quickly ceased after the removal of the appendages.

However brilliant the results may be in single cases, it is urged that conservatism and caution be exercised in removing the appendages in any case for neurosis. Pain and nervousness are not often amenable to this procedure; the condition is generally rendered worse thereby. But when the convulsive seizures have extended over a distinctly long period, and are positively associated with the menstrual rhythm, and two experienced physicians agree after careful consultation, then the removal of the appendages may be considered.

The menopause signifies the cessation of menstrual life. The seed-time and harvest of the sexual life may be considered as lasting thirty years. The menopause occurs between the ages of forty-five and fifty. It is a slow process, as puberty is. It is characterized by instability of nervous centres. The *sweat centre* is very unstable, in some cases varying in its activity every few minutes. The *heat centre* is disturbed, as is shown by the flashes of heat which the patient describes. The *vaso-motor centre* is probably the most unstable. To the unequal circulation are perhaps due the many and varied pains, the flushing and paling, the fears, emotions, and feelings of impending dissolution. Either the abdominal or the cerebral brain is unequally fed, owing to irritation of the vasomotor centre.

The cause of the disturbance, I think, chiefly lies in *atrophy of the hypogastric plexus*. The thirty years of menstrual rhythm have established permanent periodic forces. Now if these established forces cannot travel in the old direction (over the hypogastric) they will travel over other plexuses of the sympathetic to other viscera than the uterus. The sudden burden of new forces imposed on the viscera is liable to derange their rhythm and thus enhance the irritation and instability of the nerve centres. Irregular nervous action is manifest. The hyperæsthetic condition of the nervous system exalts all the reflexes. Digestion is disturbed. Emotions and established mental habits are more or less subject to disturbances.

When the period of sexual activity begins early it generally lasts until the woman is well along in years, whereas a late advent augurs an early cessation. The menopause can be produced artificially by removing the uterine appendages, and especially by tying the uterine artery, as it courses along the sides of the uterus, according to the method I have elsewhere described. An artificial menopause is generally more stormy than a natural one; the pathological manifestations are more pronounced. One or two years may elapse after the operation of removal of the appendages before the menstrual functions altogether cease. The chief danger of the menopause is from malignant disease—cancer,—but endometritis is not rare. Women generally become stouter after cessation of the menses. Visceral derangement is due to reflex action. The heart palpitates, the liver is disturbed, the skin becomes pigmented, and indigestion arises. In the genitals, atrophy is the essential phenomenon; the hypogastric plexus, the uterine artery, uterus, tubes, and ovaries, all present a shrinking appearance.

Sometimes a woman at the advent of the menopause will be quite nervous for several months when she has no menstrual discharge, but will be at once quieted and made easy by a considerable flow.

The multiform symptoms in the menopause are more intelligible when one looks at the great changes which progressively occur in the genitals. The vulva flattens and shrinks by absorption of subcutaneous fat. The vagina contracts in every direction, its most apparent decrease being longitudinal. The whole uterus diminishes; sometimes the neck almost disappears. The Fallopian tubes shrink to thin cords. The ovaries shrivel and atrophy in the most marked manner of any part. I have been sometimes almost unable to find anything in autopsies but a simple remnant of the ovary, in women of sixty to seventy years—nothing but a piece of white connective tissue as large as a small bean in the contracted, shrunken broad ligament. The mammary glands become shrunken and flabby. In some cases between sixty and seventy years of age, in autopsy I have found the uterine artery much atrophied and losing its spiral course, and the lower end of the ovarian artery almost obliterated.

But the essential anatomical point lies in the atrophy or partial obliteration of the hypogastric plexus. If one dissects the genitals of a woman between sixty and seventy years of age, he will find that only the larger strands of the hypogastric plexus are distinct; many of the smaller strands have become invisible by shrinkage. The main atrophy of the hypogastric begins at the uterus, and it is most apparent where the plexus spreads out like a fan in the broad ligament. The atrophy is sometimes apparent as high as the bifurcation of the aorta. The wasting and partial obliteration of the hypogastric and ovarian plexuses of nerves of the genitals constitutes the chief phenomenon of the menopause. In the sudden impairment of the normal nerve apparatus of the genitals lies the cause of the violent disturbance in the regulating centres and visceral rhythm. The rapid senile atrophy of large nerve plexuses is sure to derange nutrition and old-established functions. The nerve forces which have traveled for thirty years over the hypogastric plexus are violently shut off, and suddenly turned over to other nerve plexuses.

The treatment of the menopause should be hygienic. The bowels should be regulated. As the track of the hypogastric plexus is damaged from atrophy and obliteration, the accumulated nerve force is reflected on to the viscera and cerebro-spinal centres; the result is that the heart may become rapid or irregular, the liver is disturbed in its rhythm and function, the alimentary tract suffers, the skin is disturbed, and pigmentation arises on the body. Morbid mental symptoms may arise. The superstitions among the laity that the moon has something to do with menstruation, that menstrual blood is poisonous, and that great numbers of women menstruate at the same time, it is unnecessary to notice.

In dealing with the diseases of menstruation and the menopause, one must not treat the disease, but the patient. The physician must be on the watch for masturbation as a causative factor, and must not overlook the neurotic effect of disappointment in love. Salt baths, simple hot vaginal injections, and the regulation of the bowels by hygienic measures, may be all that is demanded. All complicating troubles must be sought for, as hæmorrhoids, adhesions about the clitoris, anal and vulvar fissures, worms, itching around the genitals, and irritating discharges.

THE THIRD LANDMARK IN GYNÆCOLOGY—LABOR.

The general effects of labor are nearly always produced through some local condition. The immediate landmark of labor is generally some solution of continuity, a non-return to normal, or an infective process; possibly temporary or permanent mental disturbance. The remote landmark of labor may be some chronic physical or mental condition. The most frequent local effects are cervical and perineal laceration, endometritis, metritis, salpingitis, and ovaritis, *plus* as much peritonitis as the infective process involves as it spreads from the fimbriated end of the Fallopian tube. Non-infected lesions generally recover permanently, but infected lesions mark the pathology of the landmark of labor.

As preliminary to a consideration of the disturbances which arise from this landmark, it may be well to call attention to the intimate and widespread connection of the genitals with the whole nervous system—the cerebro-spinal axis and the sympathetic system. The sexual instinct is a dominating one throughout the animal kingdom. It is most powerful in males, and hence the physical and mental vigor of the best animals is propagated. All through the stages of animal evolution every other instinct must bend to the sexual. The weapons of offense and defense possessed by animals are primarily to cultivate and defend the sexual instinct. Evolution, progress, and civilization strengthen the instinct both physically and mentally. When we pass to man the sexual instinct is rather heightened than diminished. Parents aim to make good marriages for their children; and the selection of the fittest, both physically and mentally, is a continuous process. From such premises, patent to all observers, it is quite obvious that evolutionary forces have through long ages established a very close connection between the nervous system and the genital—the organs which gratify the sexual instinct. A physical instinct is always heightened by increasing mental forces; for the mental quality will recur frequently, and repeated congestions of any part will enhance its size and importance. This is just what has happened with the genitals of animals that possess an increasing mental force, until a close, intimate and widespread connection now exists between the genital organs and the nervous system.

This intimate relation of nerves and genitals possesses an element of selective progress in the animal race. Yet the disadvantage of a highly cultivated structure is that disease is apt to arise in both genital and nervous systems. A few remarks on the nerve apparatus of the genitals may be advantageous in this place, as labor is the first landmark where manifest tissue and nerve changes arise.

The genitals are supplied with two kinds of nerves, the spinal and the sympathetic. The sympathetic nerves are not sheathed or medullated—they may be compared to a non-insulated electric wire. The pain which they transmit is of a dull, aching, dragging, or sickening character. The internal genital organs are supplied chiefly by the sympathetic nerves.

The spinal nerves are medullated or sheathed; they are sensitive and well insulated, and carry impressions of pain of the most acute and lancinating character. They supply chiefly the external surface of the genitals, but also the muscles, so as to hold the genital skin and muscles in harmony. They are protective nerves. In the order of their importance, those which supply the genitals are (1) the internal pudic, (2) the fourth sacral, (3) the pudendal, (4) the ilio-inguinal, and (5) the genito-crural.

The sympathetic nerves supplying the genitals consist of:

1. The great hypogastric plexus, which has its origin in the abdominal brain and the lumbar lateral chain. This great plexus of nerves passes along the aorta to just below its bifurcation, when it forms a kind of coalescence of the strands into a disk. It then divides and passes along the sides of the rectum and vagina; many of its strands turn up between the broad ligaments, along the sides of the uterus, to supply the body and fundus of that organ. (The nerves of the uterus are best seen, according to my experience, by dissecting a six-months' fœtus which has been in pure alcohol for six months. In a spare

young cadaver the hypogastric plexus can be fairly well traced up along the side of the uterus and followed into the body and fundus.) The plexus spreads out in the broad ligament like a fan. At the junction of the uterine body and cervix posteriorly I frequently find irregularly shaped nervous ganglia; some style these the cervical ganglia.

2. The ovarian plexus consists of nerve strands from the hypogastric plexus (passing along the ovarian artery), from the abdominal brain, and from the lateral chain. These three main strands pass to the ovary, Fallopian tubes, and fundus of the uterus. An enormous amount of nerve tissue is found in the ovary. Of course the sympathetic nerve supplies portions of the genitals wherever blood-vessels exist.

The main spinal nerves which supply the genitals are the pudic (third sacral) and the fourth sacral. The pudic nerve is substantially the third sacral, but it contains branches from the second and fourth sacral. The distribution of the pudic nerve is to the bladder, to the pelvic floor (levator ani), and to the external genitals and the rectum. I am in the habit of illustrating the branches of the pudic nerve by the hand and forearm (see page 19). The fourth sacral nerve sends branches to the uterus, bladder, rectum, and levator ani. The pudendal nerve is a branch of the small sciatic, and supplies the clitoris, vulva, perineum, and rectum; it keeps the external genitals in direct relation with the gluteus maximus muscle, which is the muscle of coition. The ilio-inguinal nerve supplies the labia; and the genital branch of the genito-crural supplies the round ligament of the uterus. With such an enormous and intimate nerve supply to the genitals, it will easily be seen that neurosis may arise from trauma, from infection, or from reflex action of the genitals. For example, we have, as is detailed on page 37, (*a*) a point of irritation in the genitals, (*b*) indigestion, (*c*) malnutrition, (*d*) anæmia, and (*e*) neurosis.

With a clear idea of the highly complicated genital nervous apparatus, we will be better prepared to remove the offending pathology. The uterus has the greatest nerve supply of any of the viscera, and therefore we may expect the greatest amount of neurosis from pathological conditions arising in it. It may be stated that the essential pathology of the sympathetic nerve is by reflex action. The reflex action from the uterus may disturb any one viscus or all the viscera, both as to function and assimilation of food. Whenever an adult female is suffering from reflex troubles, the cause is generally to be found in the genitals. It must be remembered that reflex action travels on definite nerve lines and is reorganized in definite ganglionic centres. Hence by anatomical and physiological knowledge the cause and effect of a disease may be discovered.

We will now take up some of the common disturbances following labor. The first will be *lacera-*

tions of the perineum and *injuries to the pelvic floor.* The perineal body is made up of the union of the transversus perinei, bulbo-cavernosus, levator ani and sphincter ani muscles, together with considerable connective and elastic tissue fibres. The perineum embraces the distance from the posterior vulvar commissure to the anterior margin of the anus. Most parous women have a slight perineal laceration.

The uses of the perineal body are: (*a*) to direct the lower end of the vagina forward and the lower end of the rectum backward; (*b*) to close both rectum and vagina; (*c*) to prevent the mingling of rectal and vaginal secretions, by separating the ends of the canals; (*d*) to support the lower ends of the rectum and vagina. Injury or loss of support of the perineal body allows the gradual descent of the uterus, because the pelvic floor is generally injured in any external perineal laceration. Trauma of the perineum also gives opportunity for infection, for, as a rule, a woman in labor must be considered a wounded woman. Subinvolution of all the genital organs ensues, and their supports are elongated. The perineal body strengthens a tired point in labor.

During the past three years I have cultivated an operation for repairing the lacerated perineum, which I learned from Mr. Tait while his pupil in 1890. It is known as Tait's flap-splitting operation, and is based on the fact that when a lacerated perineum is healed, the cicatrix is transverse to the vagina. The principle on which the operation is made is the resplitting of the old cicatrix and restoration of the perineal body. The method which I have used for over two years has the additional feature of splitting the recto-vaginal wall from one to two inches. It appears to me that I have better results by this modification of Mr. Tait's plan.

Pathological conditions of the *vagina* resulting from labor are so rare that I will not stop to consider them here, except to mention vesico-vaginal fistula, which is readily cured by the flap-splitting method.

The subject of laceration of the *cervix*, naturally comes next in order. The detrimental effects of laceration of the cervix, general and local, have been very much exaggerated. The real damage to the woman is due to endometritis, from infection entering the uterus through the lacerated cervix. When the laceration is sufficiently extensive to form large cicatrices which compress nerve strands, reflex irritation may be set up, causing disturbances in distant organs; or the large cicatrix may induce local pain from nerve pressure or nerve degeneration. Some cervical laceration are so extensive that they keep up endometritis by exposing the lining membrane of the uterus continually to infection.

The treatment of a lacerated cervix consists in excising the cicatricial tissue and coapting the denuded surfaces with silkworm-gut, silver wire, or silk; I use silkworm-gut, and leave the stitches in the wound from four to six weeks. I nearly always curette the uterus when performing operations for cervical laceration, as I consider this procedure the most beneficial of any involved in the treatment of these cases.

The next untoward result of labor is *endometritis*—an inflammation of the lining membrane of the uterus (and cervix). The endometritis following labor is due to trauma or infection. There is, first, congestion, and, second, hypersecretion of the glandular structure which may end in ulceration or suppuration. Endometritis may be either glandular or interstitial; in either case the changes in the endometrium manifest themselves by altered secretions. The diagnosis of endometritis rests on hæmorrhage from the introduction of the sound, or excessive mucous or purulent secretions observed flowing from the os. In doubtful cases, if a clean tampon be placed in the vagina for, say, ten hours, and on being withdrawn is found discolored with pus, the diagnosis is assured. I think I am safe in asserting that ordinary leucorrhœa is a manifestation of endometritis.

The most useful and practical treatment for endometritis following labor is uterine dilatation, curetting, galvanism or the douche used in connection with the glycerin tampon.

Non-puerperal metritis follows chiefly endometritis, *i.e.*, infection. It occurs in the young, and in my opinion is the cause of many non-developed uteri. If the metritis occurs at about puberty, the result may be an infantile uterus. The metritis arrests uterine growth. It may be asked how a young girl can acquire a non-specific metritis. The answer is that she may acquire an endometritis by (*a*) stagnation of uterine secretions; (*b*) the menstrual flow opens up the uterus so that various microbes enter; (*c*) ordinary dust may irritate the mucous membrane; (*d*) the patient may manipulate the parts and allow accidental entrance of microbes; (*e*) reflex irritation from any pelvic point may induce congestion of the endometrium, which may be followed by endometritis, just as bronchitis arises. When once the girl acquires endometritis, metritis may follow at any time. In such cases the uterus is frequently hard and small; dysmenorrhœa exists from distention of the inflamed uterus at the monthly congestion.

The treatment for metritis of non-puerperal origin is not very satisfactory, as its nature is often chronic and the menstrual functions are deficient. The gynæcological tripod—anteflexion, dysmenorrhœa, and sterility—often exists in such cases. Gestation is almost hopeless, and painful menstruation is frequent. The treatment consists in curetting, electricity, the douche connected with tampons, or removal of the tubes and ovaries. I suggest that the uterine artery which courses along the sides of the uterus be ligated down as far as the internal os, and that will insure the atrophy of the uterus to such an extent that all menstrual functions will be destroyed.

I have operated on about a dozen cases by this method, and in all the uterus has atrophied rapidly.

The pathological conditions of subinvolution must be considered as chiefly resting on metritis and closely connected with lymphangitis, phlebitis, perimetritis, parametritis—infective processes. Whether the large subinvoluted uterus is the result of proliferation of connective tissue or increase of muscular elements, must be left for the special pathologist to determine. Dr. Sinclair, of Boston, reports that in the great majority of one hundred and eight cases, carefully examined, the uterus had returned to its normal state in three weeks. Subinvolution is due to infection or trauma. I have observed in deaths following parturition that at the autopsy the lymphatics were filled with a straw-colored substance, and extended through the uterine wall outward toward the peri-uterine cellular tissue. Hence lymphangitis plays a rôle in some of these cases.

One may also note in some cases that phlebitis, starting especially from the placental site, is present in various grades. In the mouths of the veins and for some distance from the placental site there is considerable débris.

The subject of cellulitis following labor is now generally limited to the word "phlegmon." A phlegmon will in most cases rapidly suppurate and break in some direction, *e.g.*, over the iliac crest, above Poupart's ligament, in the vagina, rectum, or bladder.

The subject of cellulitis has been the battleground of gynæcologists for forty years. Cellulitis is located around the uterine neck, and in the fine white tissue between the broad ligaments. I have carefully examined post-mortem probably about one hundred uteri, and I cannot say I ever came across one case which began as cellulitis, but I have several times found cellulitis radiated from the mouth of the Fallopian tubes. I have spent hours, and even days, examining such bodies, but after several years of this work I am now thoroughly convinced that cellulitis as a primary disease is very rare and must be limited in general to the phlegmon following abortion or labor. If one will think how seldom cellulitis is found along the rectum, he may form an idea of how often pelvic cellulitis occurs as a primary disease. How often does cellulitis occur around the bladder, or around any other hollow organ?

It must not be supposed that the rule that cellulitis does not generally occur along a hollow organ is broken in prostatitis. Four years ago I proved that the diseases around the prostate did not belong to it, but were pathological conditions in the semen-sacs; I have proved them again and again to be purely vesiculitis from gonorrhœa. Spermato-cystitis may result from gonorrhœa. Such troubles are exactly analogous to pyosalpinx in the female. Hence it is a general rule that cellulitis is not frequent around a hollow organ. But it does occasionally occur. It occurs around the rectum, the bladder, intestines, and uterus, but it is from some accidental penetration of infection through the veins and lymphatics.

Pelvic cellulitis occurs, as may be seen by the naked eye. In an autopsy the lymphatics of the uterine wall may be seen distended—metro-lymphangitis; the veins may be seen enlarged and inflamed—phlebitis. Autopsies will demonstrate that phlebitis is apt to show itself as starting from the placental site; the pathological condition in various degrees extends outward from the site and fills the veins with débris and coagula. Of course the lymphatics surround the veins more or less. The perivascular lymphatic channel soon becomes infected from the infected veins; or the infected perivascular lymphatic channels may infect the veins and cause phlebitis. Lymphangitis and phlebitis are very closely associated. The pelvic cellular tissue may be seen in autopsies in a state of cellulitis. But I wish to record it as my opinion that the ordinary swellings found in the sides of the uterus are not cellulitis. Such swellings are pathological conditions of the tube. A cellulitis can and does occur from an extensive cervical or vaginal laceration; the lymphatics and veins in such cases are not generally much involved, nor does the cellulitis long endure, for it recovers soon, like any infective or traumatic cellulitis in any part of the body. On the other hand, the affection which has been called pelvic cellulitis is really tubal and often of gonorrhœal origin, and, like malignancy, will not be cured. But as the gonococcus does not thrive well in any tissue except cylindrical epithelium, it will not grow and persist in the pelvic cellular tissue.

Endometritis, subinvolution, metro-lymphangitis, phlebitis, and cellulitis, may be looked upon as consecutive stages, or at least closely associated pathological conditions.

The treatment of subinvolution and its frequent associations demands much care and judgment. In the first place I wish to warn the practitioner against any operative interference on the uterus through the vagina when pus or even salpingitis exists in either tube. If the uterus is fixed, all operative procedures or manipulations should be performed with caution. When no contra-indications exist, the treatment of puerperal subinvolution consists of douches, increased from a quart of warm water up to ten quarts of hot water three times daily. It should require twenty to forty minutes to take the douche, and the patient should lie on her back. The douche should be gradually increased in heat and quantity, and in ten days the patient will be taking ten to fifteen quarts three times daily. Glycerin tampons should be used two or three times a week only, as more frequent use is liable to cause irritation. If this is not sufficient, the further treatment may consist in dilatation, curetting, and swabbing out with pure carbolic acid. I do not pack the uterus with gauze, but drain with a rubber tube held in place by a suture in the cervix. Painting the cervix and vault of the vagina with iodine three parts and carbolic acid one part, stimulates the tissues to activity and hastens absorption. Rest in bed is the all-important treatment in such condition. Too early rising after labor is a frequent cause of subinvolution. Tonics containing iron and nux vomica are valuable aids. Electricity may be used with much advantage; my experience is that forty to fifty milliamperes is the best current to use in these cases. The bowels are nicely regulated by ordering a tumblerful of water with one-fourth to one teaspoonful of epsom salts every night on retiring; stated periods for defecation being established as already suggested.

The effects of labor on the Fallopian tubes may be many and various. The chief damage is produced by infection. The left tube is affected more frequently than the right—according to my experience, about one-third oftener. The reasons for the frequency of these left-sided attacks have been already given (see page 17). It is said by some that the right vein has valves and the left none, but I have many times found valves in the left ovarian vein.

As the infective process in the uterus advances toward the tube, endosalpingitis arises. A kind of catarrhal process results which deranges the mucous membrane of the tube. The secretion of the endosalpinx is altered, especially in the ampulla and outer two-thirds of the tube. This inflammatory process progresses toward the ovary and infects it. If the mouth of the tube is closed by peritoneal adhesions or ovarian tissue, the tubal lumen will frequently become filled with mucous serum or muco-purulent fluids. In this way salpingitis arises. The ovary becomes hypertrophied during gestation, and the infection passing into it from the tube during the puerperium causes ovarian subinvolution. It must be remembered that ovarian disease is nearly always secondary to tubal disease; it depends on infection carried through the tubes.

Frequently the ovaries remain large for long periods after labor. Relaxation of the ovarian ligaments and pelvic tissue allows intra-abdominal pressure to pass the ovary much lower than normal on account of increased exposure of surface.

In cases of infection following labor which I have examined either after extirpation or at the autopsy, the tube was much thickened by inflammatory products. The main pathological changes are in the mucous membrane, and especially in the ampulla. The whole tubal wall—endosalpinx, musculature, and perisalpinx—becomes œdematous, friable, and infiltrated with inflammatory products. The tube assumes a tortuous, convoluted form. The fimbriated end of the tube is generally spread out and plastered on to the surface of the ovary, the ovary and tube being often smelted into one mass and surrounded by large exudates of organized inflammatory products.

In several cases, both in the living and in the dead, I have found the ragged aperture in the tubal wall where the pathological products escaped. The tubal wall is easily ruptured in the early puerperium. The temperature and pulse in such cases are dangerously high and irregular. In cases where rupture occurs, the only chance of saving life is by prompt laparotomy. I have saved life after such tubal ruptures in the puerperium by laparotomy when the temperature was 106.5° F. and the pulse as high as 150. However, it is more frequently the case that tubal infection during the puerperal state results in chronic inflammation of the tube and ovary. The tube, becoming contracted or convoluted, remains spiral, and its walls grow thick and hard; the ovary smelted and adherent to the tube. In menstruation the tube, in attempting peristalsis, gives rise to severe pain—tubal colic—the tube's inflamed condition rendering painful all efforts to drive fluids through its lumen.

If such cases have not been infected with gonorrhœa, they can be frequently relieved by the daily use of hot douches and glycerin tampons, and especially by rest in bed.

It may be considered as proven that the pathological conditions found on either side of the uterus after labor or abortion are salpingitis and local peritonitis. The shortening of the ligament is due to contraction of the peritoneum after local attacks of peritonitis. As a proof of this, after the removal of the swollen tubes and ovaries the boggy swelling disappears on vaginal examination. This also shows that the chief pathological condition is not cellulitis, but belongs to the tube and ovary. The pathological condition is limited by the peritoneum, and though the infective process passes through the peritoneum and more or less involves the cellular tissue of the broad ligament from continuity, nevertheless the head and front of the matter is salpingitis—to which are added ovaritis and more or less peritonitis in the neighborhood of the tubal fimbriæ. The slight amount of cellulitis is secondary and a process of invasion from the primary forces in the tube. I have frequently found in autopsies that the infective process had gone from the mouth of the tube to a considerable distance into the cellular tissue of the broad ligament, but by careful dissection it could be observed that the whole pathological condition was distinctly around the tubal mouth, and that this condition distinctly lessened at a distance from the tubal fimbriæ. Also, if the cellular tissue had been the primary seat of abscess, it would have been more or less destroyed; but, as a matter of fact, just below the peritoneum the process was found to have suddenly ceased, all cellular tissue beyond it or between the folds of the broad ligament being as white as hoar frost, resembling a powder puff.

I once dissected for many hours in an autopsy where pelvic inflammation was extensive. I thought

I had found a case of primary cellulitis. The ureter itself passed through dense, strong, organized exudates, but owing to its dilatation and contraction it had kept open a tunnel amply sufficient to allow it to functionate properly. In this case the organized exudates were limited to the fimbriated tubal end, extending just below the peritoneal surface, but just beyond the organized exudate the cellular tissue was healthy and beautiful as eider-down.

It is not at all easy to discriminate between a primary invasion of the tube and that of cellular tissue. On the interpretation of the origin of the infective process in the pelvis rests the diagnosis between salpingitis and cellulitis, and the proper treatment. I had dissected several female cadavers before I became thoroughly convinced from Nature's own field that the chief disease in the pelvis of women is in the tube, ovary, and peritoneum, and not in the cellular tissue. I consider it very essential for the practitioner to realize the pathology of the female organs, as the pathology alone determines proper treatment. There is but one way for a practitioner to settle the matter for himself, and that is to spend time at autopsies and slowly dissect the pelvic structures until he is convinced of the origin of the primary seat of infection. We do not expect to find cellulitis around the rectum unless there is a perforation out of which the infection has invaded the cellular tissue. So we need not expect generally that infection will pass through the uterine wall without an aperture or distinct abrasion such as follows labor or abortion where a phlegmon may appear. Do we expect cellulitis around the intestines without a perforation? Do we expect cellulitis to be commonly found around any hollow organ without a distinct perforation through which the infection may escape? The argument is simply that cellulitis in the pelvic region is similar to cellulitis in other localities, and that it generally occurs around any organ with distinct perforation or sufficient pathological condition to favor microbic invasion through its walls. Though the uterus at labor or abortion may offer more facilities for microbic invasion of surrounding cellular tissue by way of the lymphatics and veins, than do other hollow organs, yet this liability is not of sufficient importance to demand much consideration. The one unique and peculiar condition of the relation of the uterus to the peritoneum explains the whole matter. It is the direct continuation of mucous and serous surfaces. The Fallopian tube opens directly into the peritoneal cavity, and infection travels from the uterus through the tube into the peritoneal cavity. Pelvic trouble in women is peritonitis, and not cellulitis. Adhesions and contractions in the pelvis are generally peritoneal in character.

One may look for the landmarks of labor in the genital tract or peritoneum, (*a*) in the vulva and perineum, (*b*) in the vagina, (*c*) in the cervix, (*d*) in the uterus, (*e*) in the Fallopian tube, (*f*) in the peritoneum, and finally, (*g*) in the cellular pelvic tissue from pathological invasion.

However, should an accumulation of pus (a phlegmon) occur in the cellular pelvic tissue, it will break in the directions of least resistance. In autopsies I have found perforation of the small intestines, rectum, sigmoid flexure, bladder, and vagina. In one autopsy I found five intestinal perforations and a bladder perforation. The general directions of rupture of so-called pelvic abscesses are (*a*) over the iliac crest, (*b*) above Poupart's ligament, (*c*) into the rectum, (*d*) into the vagina, (*e*) into the bladder, (*f*) into the peritoneal cavity, the latter being nearly always fatal. In 1885 I was called to a case in which I found a large accumulation of pus in the pelvis. I ordered the patient to bed at once and enjoined complete rest in bed, but a few hours afterwards she got up to defecate, and after considerable straining the abscess ruptured, and she died in six hours. At the autopsy I found about a pint of pus in the peritoneal cavity.

At this point I wish to speak of an important landmark of labor, the so-called prolapse of the uterus, better designated by the term "sacro-pubic hernia." It is probable that labor is the incipient cause of 85 per cent. of sacro-pubic herniæ. Some practical anatomical points necessary to a thorough knowledge of the processes involved, I have detailed on pages 10–13.

In uterine prolapse, or sacro-pubic hernia, we have to deal essentially with the pubic segment of the pelvic floor. The pubic segment is the one that prolapses or is forced out of its place by intra-abdominal pressure. This segment may be said to be held by two straps to the sacrum—by what are known as the utero-rectal ligaments, commonly called utero-sacral ligaments. I prefer to call them utero-rectal ligaments, as the greater mass of the muscles end finally in the rectum. The vagina passes from the pubic arch to the cervix, and the utero-rectal ligaments pass from the cervix back to the rectum, and a few fibres go to the sacrum. Hence the vagina and the utero-rectal ligaments reach from the pubic arch to the sacrum, and these two structures act as a supporting beam for the uterus.

The mobility of the pubic segment and the elasticity of the sacral segment make possible the bimanual examination. The pubic segment can be pushed up and forced down by the hand, thus enabling the finger to explore in all directions, while the sacral segment has enough elasticity to allow the exploring finger to push it upward.

The valves of the pelvic floor are opened up by labor when the child's head passes out—the pubic segment being drawn up and the sacral segment driven down. The anterior lip of the os in labor will rise above the pubis, while the posterior lip will be thinned, elongated, and reach far down in the pelvis

—at least, such were the conditions existing in a case which I saw with Professor Schroeder in 1885. (In this case the woman died suddenly in the third stage of labor, and Professor Schroeder had the body opened antero-posteriorly from skull to coccyx.)

Another method of opening up the valves of the pelvic floor is by the knee-and-elbow position. If the woman is in the knee-and-chest position, and a speculum is introduced into the vagina, the air will rush in and distend the vagina. The air raises up the pubic segment and slightly depresses the sacral segment.

A third method of opening up the pelvic valves is by what is known as prolapse of the uterus, or sacro-pubic hernia.

The three great factors to consider in sacro-pubic hernia are: (1) intra-abdominal pressure; (2) loss of tone in the pubic segment; (3) deficient support in the posterior segment.

Intra-abdominal pressure is muscular pressure. The pressure inside the abdomen is greater than the atmosphere pressure. The reason that a tube will drain the abdomen while standing perpendicularly is because the internal pressure is greater than the external. The greatest factor in sacro pubic hernia is intra-abdominal pressure. This force presses in all directions alike, so that the uterus has nothing to do with prolapse, any more than the cord in hernia.

The uterus may be represented as suspended in a fluid mass, with pressure on all sides just alike.

Prolapse can occur only when the essential supports of the pelvic valves, on which it rests, are weakened. This weakened support lies partly in the loss of tone in the pubic segment, which becomes loosened in its attachments; it has a kind of subinvolution, from which it never recovers. The intra-abdominal pressure pushes it past the sacral segment, and the vaginal walls appear at the vulva.

The deficient support found in the sacral segment is due to two factors: (1) the straightening out of the curve in the sacral segment; (2) the laceration of the perineum. The perineum is like a door-step; it acts as a barrier against the prolapse of the uterus. If the perineum be lacerated and the sacral curve straightened out, it is easy for intra-abdominal pressure to accomplish the forcing-out of the uterus. In order to prolapse, the uterus must change its natural position. The prolapsed uterus must almost invariably become first retroverted, and then the intra-abdominal pressure acts on the anterior surface and forces it downward. But in the normal position the intra-abdominal pressure exercises its force on the posterior surface, and the uterus can prolapse only in some accidental manner.

It may be easily observed while a woman is on her back on the table, that the uterus moves with every respiration, word, cough, or any change in the intra-abdominal pressure. Every step a woman takes produces a uterine movement. This natural freedom of motion on the part of the uterus leads us to look to two factors to understand sacro-pubic hernia, viz., the pelvic valves, and the essential uterine supports. If the pelvic segments or valves are intact, the uterus will rest on the unbroken pelvic floor. In regard to the uterine supports, I will mention simply the essential ones:

1. The position of the uterus is determined by its connection with the pelvic walls and adjacent organs.

2. The rigid vagina, with its muscular and connective tissue, is an essential uterine support.

3. The peritoneum holds the uterine supports in definite relation, and by reason of this constitutes an essential support. The peritoneal supports of the uterus are the most elastic of all.

4. The utero-rectal ligaments must be placed among the most essential uterine supports. (It is curious to note that nearly all the essential uterine supports are fastened to the junction of the uterus and cervix.) No uterine prolapse can occur without elongation of these ligaments, which hold the cervix in definite proximity to the sacral bone. Shortening of the utero-sacral ligaments produces anteversion, and elongation of the ligaments produces retroversion. These ligaments consist of muscular fibres enclosed in peritoneal folds.

5. The connection between the anterior surface of the cervix and posterior wall of the bladder serves

as an essential uterine support. This connection is two-thirds to three-fourths of an inch long, and is quite firm.

6. The pelvic fascia, the recto-vesical fascia and ligaments, and the pubo-vesico-uterine ligaments, form the guy-rope or indirect supports of the uterus, and are more especially attached to its fundus, *e.g.*, the anterior round ligament, the posterior round ligament (ovarian artery and vein), and the broad ligament.

It is not easy to decide in each case whether the vagina or the uterus is first pushed out. Sometimes I have thought I found the uterus pushed down and the vagina still remaining normal, but in the great majority of cases the intra-abdominal pressure bears down upon and loosens the vaginal walls so that they roll out, first the anterior and then the posterior. It must be remembered that the cervix may be simply elongated, and that it is possible for the fundus to be in its normal position even though the whole vagina is entirely pushed out of the vulva. So far, no explanation of the pathology of cervical elongation has been fully satisfactory. The only explanation which dissection and clinical experience have suggested to me as being reasonable is that the vault of the vagina drags on the cervix, because of intra-abdominal pressure. A case of this kind came under the care of Dr. Lucy Waite and myself, in which the fundus was almost normal in position, but the cervix was elongated over four inches, with almost complete eversion of the vagina. After removing the whole uterus by abdominal incision, we observed that the cervix had shortened fully one-half.

The operation which I have to offer for the radical cure of sacro-pubic hernia (prolapse) is one which I have practiced for several years. It consists in performing, if required, three operatious at one sitting.

The first step consists in amputation of the cervix, if it be elongated or pointed—the object being to direct the course of the cervical canal toward the sacral cavity, so that intra-abdominal pressure will no longer push the point of the cervix toward the vaginal outlet at every movement. A uterus passing out of the vaginal canal is retroverted, and will point toward the vulva, while a normal uterus will point the cervix toward the sacrum. If the cervix is not pointed, but broad, I seldom amputate it.

The next step is to remove a piece of the anterior vaginal wall, and then to unite the edges. The object of this procedure is to direct the cervix toward the hollow of the sacrum, or away from the vulvar outlet. It also elevates the bladder-wall. I denude a portion of the anterior vaginal wall the size of a silver dollar—sometimes much more. The edges are then united with silkworm-gut.

The final step in the operation is to make an extensive perineal flap operation after the method of Mr. Tait. The anterior cuts should extend as high up as the urethra, and the back cuts to the posterior margin of the anus. I modify Tait's flap by separating the vagina from the rectum a distance of one to two-and-one-half inches. I leave the sutures in place four to six weeks. This operation has proved a success during several years' trial.

In general the landmarks of labor may be seen in diseases of the mind and nervous system; in infection and inflammation of the genital tract; in peritonitis and inflammation of the pelvic connective tissue; in sarco-pubic hernia; in trauma and laceration of the structures. By metastatic process the disturbances may extend to any viscus or any portion of the body. Special senses may be perverted or destroyed. But the pathological conditions are generally limited to the genital tract and organs, the pelvic peritoneum, the rectum, and the bladder.

Lacerated perineum is such an important matter in the landmark of labor as to deserve detailed consideration, even though some points may be repeated.

Perineorrhaphy (for the restoration of the integrity of a lacerated perineum) is sometimes necessary in order to prevent prolapse of the pubic segment of the pelvic floor and the uterus. The anterior segment of the pelvic floor—comprising the retropubic fat, the bladder, and the anterior vaginal wall —is called the anterior, the pubic, the visceral, the movable, and the obstetrical pelvic segment. The posterior segment of the pelvic floor—comprising the posterior vaginal wall, the perineum, and the rectum —is named the posterior, the vertebral, the sacral, and the fixed pelvic segment. The anterior edge of the sacral segment is tipped or bound by dense fibroelastic tissue known as the perineal body. The uterus lies immediately above the valve, and the perineum immediately below.

Uterine prolapse, or sacro-pubic hernia, can occur only by the opening up of this valve. In the virgin the pelvic segments or valves are closed. They are opened up naturally by labor; artificially by the admittance of air into the vagina; or pathologically by uterine prolapse, better termed sacro-pubic hernia. Let a woman suffering from descensus uteri be placed on the table and told to exert the abdominal muscles as if to expel the uterine contents; first will appear the anterior vaginal wall, next the cervix uteri, and then the posterior vaginal wall. The anterior pubic segment, retro-pubic fat, bladder, and anterior vaginal wall, are all involved in the prolapse, and besides these a part of the sacral segment, the posterior vaginal wall.

Difference of opinion still prevails as to the utility of the perineal body in the economy of the female genitalia, but from considerable clinical and operative work and many dissections I will claim for it the following:

1. It sustains the lower ends of the anterior rectal wall and the posterior vaginal wall.

2. It supports and directs the discharging end of the rectum backward, and the discharging end of the vagina forward.

3. It not only keeps the discharging ends of the rectum and vagina widely apart, but it gives substantial support to both organs in the terminal curve which it forms in each, thus affording mechanical advantages for maintaining closure in both apertures and preventing the easy escape of the contents; at the same time the wide separation of the ends of the two canals avoids mingling of the secretions and consequent infection and irritation from decomposition. The backward curve of the rectum and the forward curve of the vagina are important factors in pelvic support, and prevent gaping and eversion.

4. The perineal body is the point of union of four muscles—the levator ani, the sphincter ani, the bulbo-cavernosus, and the transversus perinei—besides the collections of dense connective tissue and elastic tissue. Dissections show that its length has been exaggerated in many gynæcological text-books.

5. The perineal body acts as a support to the pelvic floor.

6. It strengthens a tried point in labor.

7. Laceration of the perineal body to any considerable extent destroys the nice balance between anatomical and physiological function.

The object of the flap perineorrhaphy is: to restore partial rupture; to restore rectal function after complete rupture; to prevent prolapse of the pubic segment; to prevent uterine prolapse.

The etiological factors of lacerations are: labor; coitus; trauma. Partial perineal lacerations may be accompanied by increased vaginal secretions; vulvar patency; instability from pathological conditions of nerve-endings; neurosis from continued reflexes; endometritis from infection; descent of anterior rectal wall, posterior vaginal wall, and uterus; prolapse of bladder. Complete laceration may be accompanied by anal and vulvar patency; increased vaginal and rectal secretions; hæmorrhoids; incontinence of vaginal and bowel contents; eczema as a result of decomposition of mingled secretions; reflex neurosis from disease at the nerve-ends; reflexes from hypertrophy or atrophy of lacerated parts; relaxed tissues and prolapsus uteri from malnutrition of the parts.

Perineorrhaphy began with Paré. It passed on and was cultivated by Guillemeau, Noel, Sancerette, Mursina, Mensel, Osiander, Zary, Diffenbach, Simons, Sims, Horner, Brown, Voos, Stein, Sanger, Duneau, Simpson, Colles, and others. At present the most useful and simple method of re-forming the perineum is Tait's flap-splitting method.

If a woman with a lacerated perineum is placed on her back on the table, and the labia are well separated, one can see the old white cicatricial line which represents the healed scar. Now it may be observed that this linear cicatrix runs transversely, though the fresh tear in the perineal body did not. The perineum tears in a direction from the vagina toward the rectum, but the peculiarity is that it heals exactly at right-angles to the original wound.

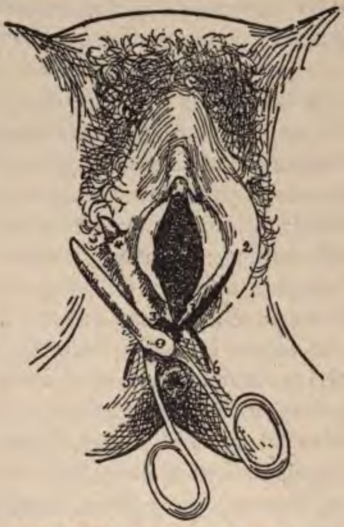

FIG. 1.—The dark line running from the vaginal orifice toward the rectum represents the old perineal laceration. The dark line running from 7 to 1 and then up on the labium to 2 shows the exposed tissue made by the scissors clip on the left side. From 1 to 6 shows another scissors clip and is known as the "back cut.' From 3 to 5 shows another "back cut." From 3 to 4 represents the blade of the scissors beneath the labial tissue ready to be clipped.

Now the flap-splitting is based on the very peculiar method of healing in the perineal laceration. Sharp-pointed elbow scissors are required. A curved needle, with a handle, and an eye at its pointed end, is also necessary.

To do Tait's flap operation, the point of the scissors is inserted in the median line of the recto-vaginal septum to a depth of about one-half inch, say at 7 in Fig. 1; the scissors' point is then carried beneath the tissue, as deep as desired, to the side of the vagina, and up the labium as high as desired, say to the point 2 in Fig. 1; a clip is then made with the scissors, exposing the tissue from 7 to 2. The point of the scissors is again entered at 7, and is carried under the tissue to 3 and up the labium to 4, where it emerges; a clip is then made, and the tissue lies exposed from 7 to 3 and to 4. The "back-cuts" are then made, running from 3 to 5 and from 1 to 6, respectively, the operation being done as in the lateral labial cuts, at such a depth as may be necessary. We now have two U-shaped incisions—one around the lower half of the vaginal orifice, and one around the adjoining aspect of the anal orifice. Now the anterior vaginal flap is seized at 7 by forceps and drawn up toward the vaginal orifice (see Fig. 2). The posterior flap is also seized by forceps at 7 and drawn back toward the rectum (see Fig. 2). The point 7, thus turned in opposite directions, will represent the apices of a long, narrow oval, as seen in Fig. 2.

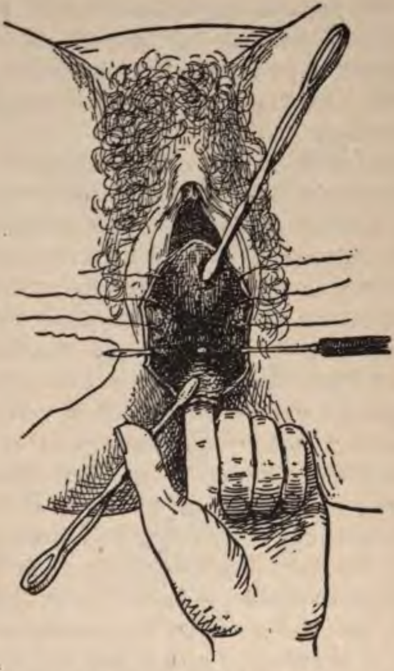

FIG. 2.—The vaginal flap is seized at 7 by forceps and drawn up toward the vagina, and the rectal flap seized at 7 and drawn toward the rectum. The raw surface is now drawn into an oval shape by tension on the two forceps. The needle is entered inside of the skin and must not pierce the mucous membrane. The needle is best managed by introducing a finger into the rectum so as to avoid penetrating the gut wall.

The second step is the introduction of three to six silkworm-gut sutures. The silkworm-gut should be put into hot water a few minutes before using, so as to make it flexible. A handled needle, with an eye in the point, is used; its point is entered just inside the margin of the wound, not in the skin or mucous membrane, and is carried under the exposed tissue to the bottom of the wound, and then, still under the tissues, to the opposite margin of the wound, where it emerges. A thread of silkworm-gut is put through its eye, and the needle is withdrawn. Three to five of such sutures are employed. The sutures may be left in place for six to eight weeks.

The operation is easily done in ten minutes. I have frequently seen Mr. Tait do it in five minutes. On tying the sutures, one will note, to his delightful surprise, that the original perineum is rebuilt. I would urge that the clips with the scissors be made deep, so as to expose wide areas of tissue. The labial incisions should be carried high up on their wall; I sometimes carry them as high as the urethra. I have so far not seen tension disturb the operation. A little practice is required so that the operator will not make a pocket above the perineum in the vagina. Be sure that the sutures grasp plenty of tissue, so that firm and uniform coaptation will exist after tying. The operation is alike applicable to partial and complete perineal lacerations. During my six months' course with Mr. Tait he would frequently remark that the worse the laceration, the better the operation showed itself. Mr. Tait has performed many hundred perineal operations by the flap method. He has twenty-six recorded cases of labor after the operation, and he told me that he had never known the perineum to be retorn.

The after-treatment of the operation is simply rest. I prefer to keep the bowels loose, and just before movement give an enema. The chances of union by first intention are better than in the denudation operation, as the rectal and vaginal flaps divert secretions from the wound.

The advantages of the flap operation are:

1. The ease and simplicity of its performance.

2. It wastes no tissue; if it fails, the patient is no worse off than before the operation.

3. It is the only operation that restores in a natural method the perineal body.

4. It withstands subsequent labors.

5. The sutures are not passed through skin or mucous membrane, and therefore are not so liable to suppurate.

6. Its certainty of healing.

7. It secures in the easiest and most convenient manner the widest possible surface for coaptation and healing.

8. The pain after the operation, in my experience, is less than after the denudation operation.

9. It can be practiced successfully where the re-

peated-denudation operation cannot be performed because of loss of tissue and excess of tension.

10. The short time required to do the operation minimizes shock.

11. The resulting cicatrix is in its natural location and linear, and will thus cause less peripheral nervous disturbance.

12. The stitches leave no cicatrices, and therefore will cause no irritation. They act like Dr. Bayard Holmes' buried sutures.

I have seen a small bistoury used in what was called Tait's flap operation, but in my opinion it was so much inferior to the operation with scissors as above described that it belonged to a totally different order of surgery.

When one ties the sutures, the newly formed perineum will look enormously large, but it will soon shrink to a natural appearance. After a little experience one can do Tait's operation so that, on healing, the linear cicatrix will so resemble the old raphe that it can scarcely be told that an operation has been done. In some of my cases the result was so perfect after eight weeks as to almost cause doubt in the minds of fellow-practitioners as to whether any operation had been done.

In performing the operation, one must not penetrate the rectum or vagina with either the point of the scissors or the point of the needle; in either case a vaginal or rectal fistula might result, or, if fistula did not occur, healing of the wound might be retarded or interfered with. One should, of course, avoid inserting the point of the scissors into the vaginal bulb

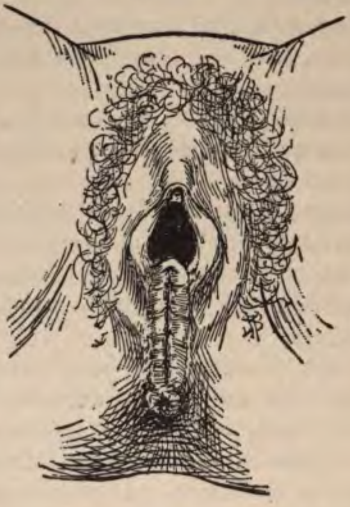

FIG. 3.—The results after tying the four sutures. Notice the wound gapes a little from 7 to 7, and that the vaginal flap peeps over the upper 7. The needle may be introduced from the margin of the wound to the bottom and then emerged, threaded, and drawn out on one side. Then the other side may be done likewise. I note this, as in a thick, fat perineum it may be impossible to pass the needle from one margin of the wound to the other without threading it twice. The sutures are all introduced before any are tied.

and so creating profuse hæmorrhage. The operator should be careful not to sever the ducts of the vulvo-vaginal glands. Again, there is some danger that the flap may not heal high up in the recto-vaginal septum; I saw such a case in a colleague's practice. I make the incisions from one-half to one inch deep. One of the difficulties is to understand how much incision can be made to produce an oval raw surface. I think the illustrations which accompany this description will show it clearly. The incisions made are, say, one-half to three-fourths of an inch deep between the rectal and vaginal walls. As the raw surface on each flap is one-half inch thick, we have a total thickness of one inch when the sutures are tied. I nearly always have one and one-half inches. Healing is quite certain, as the rectal and vaginal flaps act as sheds to direct all secretions away from the wound.

Tait's flap operation can be reversed and performed for prolapse of the bladder; I have had no experience, however, with the reversed flap. In such cases the newly acquired strong tissue would necessarily be formed in the vestibule. It seems to me there is a future for Tait's reversed-flap operation, for the principle is just the same whether the scissors clips between the rectum and the vagina or between the urethra and the clitoris. The amount of episiorrhaphy in either perineal or vestibule flap will depend on the operator's individual judgment. Tait's flap-extension will be discussed under Operations for Prolapse; it is simply the addition of episiorrhaphy, in the form of the flap method, to the perineal flap, and may be called perineo-episiorrhaphy.

The two types of perineorrhaphy by denudation differ in the method of suturing. The old method was to pass the sutures through skin, across the denuded surface, under the exposed tissue. A later method is to use what is called the "etage" stitch—the buried catgut suture of Werth, of Kiel; in English it would be called the buried spiral catgut. It is an excellent method of doing perineorrhaphy. I found by experience that when the laceration extends up into the rectum the best way is to use no rectal sutures at all, but use the spiral catgut right down to the mucous membrane of the rectum. Also, use no vaginal suture, simply carrying the catgut spiral suture up to the vaginal mucous membrane and no farther. The same may be said about using no perineal sutures unless tension is dangerous. Hence I can close a laceration of the perineum into the rectum by simply using a continuous catgut suture, which never goes through skin or mucous membrane. So far as the rectum is concerned, I found it much better not to introduce sutures into its mucous membrane. So the Diffenbach's vaginal, perineal and rectal sutures are all left out, while the denuded surface is held in fixed coaptation by a wholly buried catgut suture. But even this, I think, is inferior to the flap method.

The flap-splitting operation is very useful for a partially prolapsed uterus. I have now practiced it in perineorrhaphy for three years, and have never had a failure. I have one case in which a fistula exists between the vagina and rectum about the size of a knitting-needle, three months after operation, but I think that will heal as soon as the portion of suture, which no doubt exists there, shall slough out. The case had been subjected to several of the denuding operations, unsuccessfully, and was of thirty-four years' standing. As time goes on and I become more experienced in the operation, I split the rectum and vagina higher than I did formerly, and extend the "clips" higher up against the urethra. At the Charity Hospital many of the cases have complete laceration extending from one to three inches up into the rectum, and I have had so far no failure even in such cases. Dr. Lucy Waite and Dr. Bertha Van Hoosen have also performed the flap operation in my service at this hospital, and so far they have had no failure. I also note that other gynæcologists of the city are employing it with reported success. It may be noted that when several denuding operations have been practiced on a patient with complete laceration, and the tissue loss and atrophy have made necessary tissue scant, side-cuts to relieve tension may be made.

THE FOURTH LANDMARK IN GYNÆCOLOGY—ABORTION.

Abortion is the premature expulsion of the fœtus, whether by way of the vagina or of the Fallopian tube. The word "abortion" is generally applied to the expulsion of the uterine contents up to the fourth month of pregnancy, after which the terms "miscarriage" and "premature labor" are used. The chief dangers in abortion are hæmorrhage and infection. Abortion is worse than labor, because it is unnatural. Labor is natural. The uterus, being supplied almost entirely with sympathetic nerves from the ovarian plexus and the hypogastric plexus, is a rhythmical organ and always ready to expel its contents. Anyone can prove that the pregnant uterus is in a state of constant rhythm by placing the hand over it. I have seen Mr. Tait announce pregnancy in the early stage by simply noting the rhythm of the uterus, with his hand on the hypogastric region. But while the nerves of the uterine body are mostly sympathetic, those of the cervix are largely spinal—the third and fourth sacral. This explains why the cervix is not rhythmical; it is sober and quiet—a moderator, a sentinel, a breakwater against which dash the troublous waves of uterine agitation. I have observed these uterine waves gradually increase in violence until the neck was compelled to give way by sudden dilatation, which means cervical paralysis. In this sudden cervical paralysis and rapid recovery lies the fatal story of many an abortion. When the rhythmical waves of the uterus become very violent and force the fœtal ball with unnatural vigor against the quiet neck, the latter soon yields. But the dilatation of the neck is so violent and sudden that it becomes paralyzed and remains wide open, and then the violent uterine rhythm quickly forces the fœtal ball through the paretic neck. It will require from two to four days for the neck to recover from its paralysis, but during that time it is a wide-open door through which infectious germs pass into the uterine cavity. After the germs have entered, the neck recovers and closes its mouth with its natural vigor. This prevents drainage, and the proliferating germs pass on through the tubes to the peritoneum. Hence drainage is the all-essential element in abortion. In my experience the danger from hæmorrhage has not been very great. I have seen alarming bleeding, and fainting from loss of blood, but death seldom results from this cause alone.

In analyzing the causes of abortion, the general constitution of the mother must be considered as one factor. Another factor is the uterus, and a third is the fœtus. Under the systemic causes of abortion may be mentioned the influence of the nervous system on the uterus. An unduly sensitive nervous system may produce abortion from fright. The uterus may be induced to contract by friction applied to the nipples, or by rubbing the uterus through the abdominal wall. Strong emotions may cause sudden violent contractions of the uterus, probably by changing the circulation in the genitalia. Under the constitutional causes must be mentioned certain toxic conditions of the blood. Carbonic acid gas is known to induce abortion. Both measles and scarlet fever have, in my experience, induced sufficient contraction to expel the uterine contents. Severe attacks of malaria may induce abortion. In short, excessive uterine contractions, and finally abortion, may be caused by toxic substances in the blood.

As to the uterine causes of abortion, we may first consider that abortion is liable to occur about the time when the usual menstrual rhythm would be due. At the maximum activity of the automatic menstrual ganglia the uterus has the most muscular and vascular disturbances, and is easily excited into contractions from actual high physiological tension and habitual monthly rhythm. It has been observed that most abortions occur about the time of the third menstrual rhythm, because at that time the uterus has taken on active nutrition and rapid growth—the placenta has begun to grow and become susceptible to disease. The enlarged uterus has just begun to rise toward the pelvic brim. At the third month the location and condition of the retroverted uterus are most difficult to rectify.

Among active causes of abortion must be considered endometritis and metritis. An endometritis presents very poor ground for gestation. The fœtal ball cannot be nourished on pathological grounds. An inflamed endometrium presents altered secretions and abnormal nutrition. Its abnormal secretion induces irritation which sooner or later brings on violent uterine contractions. Endometritis leads to hypertrophy of the mucous membrane. This may cause disease in the placenta, or the enlarged vessels in the inflamed endometrium may rupture and allow a clot of blood to collect between the uterus and placenta which will eventually bring on contractions. Endometritis associated with flexions and versions is the chief cause of abortion. Atrophy of the endometrium often leads to abortion from insufficient nutrition being supplied to the fœtus. The atrophic, shrunken fœtus finally acts as a foreign body, which induces expulsive effort. Metritis may lead to expulsion on account of its unyielding walls, which refuse to expand under the delicate pressure of the fœtus, and soon expulsion results.

A third factor in abortion lies in the fœtus and its covering. The placenta may become diseased from various causes, and the fœtus may easily share disease and death. A dead fœtus often irritates the uterus into expelling it.

A displaced uterus which is once permanently out of position may induce abortion, for many displaced uteri suffer from endometritis and metritis.

Hyperæmia of the gravid uterus is a fruitful cause of abortion. This condition may be noted when the accident occurs at the monthly periods.

I think we may place gonorrhœa among the very frequent causes of abortion. It starts an endometritis, which seldom subsides without leaving traces of destruction and chronicity in its wake. Syphilis makes, so far as I can learn, a more profound impression on the general professional mind, but it does not destroy one-fifth as many as gonorrhœa. Syphilis is curable, but gonorrhœa is not.

The death of the fœtus is a frequent cause of abortion. In examining pigs I have often found the fœtus with a blood-clot close to it. The circulation in a small embryo is very active but of the most extreme delicacy. Its vascular mechanism is so active and yet so delicate and intricate that one watches it with wonder and fear that it may break in some district at every rhythm of the heart. Gonorrhœa and syphilis may induce inflammation in the placenta. Rupture of blood-vessels allows clots of blood to accumulate around the fœtus and smother it. Inflammations may arise in either fœtal membranes or in the fœtus itself, which may induce abortion.

Habitual abortion is no doubt the result of actual disease, though undiscoverable. Gonorrhœa and syphilis themselves cannot always be detected, though both diseases exist in the same patient. The umbilical cord may become twisted and kill the fœtus. From observations on the pig, cow, dog, sheep, as well as on the human, it appears to me that fœtal death is the most general cause of abortion.

To sum up: Abortion may arise from general constitutional disturbances, profound mental impressions, violent changes in the nervous system, high temperatures, acute eruptive diseases. Trauma of the uterus, trauma of the fœtus or its envelopes, syphilis and gonorrhœa, fœtal death, endometritis and metritis, can all contribute to abortion. The chief dangers are mainly hæmorrhage and infection, especially the latter.

One might say that abortion and salpingitis are twins. Tubal disease and abortion are almost sure to go hand in hand. The common diagnosis after abortion is endometritis, salpingitis *plus* ovaritis, *plus* more or less peritonitis around the Fallopian fimbriæ.

So far as criminal abortion is concerned, the best statistics at command assert that half the women die. However, according to the reports of hospitals, in skilled hands only about one to two per cent. die. I mean by criminal abortion the act when performed by the pregnant woman herself, or by some unskilled so-called physician or one of the laity.

The symptoms of abortion are pain and hæmorrhage. The pain consists of a weight or dragging sensation in the lumbar region and pelvis, which as it advances may assume a sharp and cutting character. The pain is due to uterine contractions and also to the forcible dilatation of the cervix; it may continue for a week, but is more frequently limited to from two to four days; in the majority of cases the abortion is completed in twenty-four to forty-eight hours. The hæmorrhage is due to rupture of the placental and decidual vessels; and as the detachment of the ovum is required for the rupture of these vessels, the hæmorrhage is to be considered as a symptom of grave import. The hæmorrhage may begin and cease suddenly, and return after a few days or remain away forever. The diagnosis of abortion is completed by the dilatation of the os, as felt by the finger, and the descent of the fœtal ball or its appearance in the discharges. If one will open the clots and débris under water, a positive abortion can often be affirmed, whereas otherwise it would always remain doubtful.

The treatment of impending abortion consists in putting the patient to rest in bed. It is best to do something definite, or positively nothing. Tinkering is almost sure to end in infection. If the hæmorrhage is considerable and the os dilated, I think the best plan is to introduce the index finger into the uterus and place the other hand on the abdomen in order to force the uterus down on the introduced finger. The uterus being steadied by the hand, the index finger can gradually and patiently remove the fœtus and placental remains. I have pursued this method time after time for ten years, and have had no bad results. Ergot may be given after the uterus is cleared, but I see no special good from it, as the uterus contracts down of itself. A daily vaginal douche of a couple of quarts of warm water is given, with the advice to remain in bed a week. The other plan—of doing nothing, but insisting on the patient keeping her bed—may be pursued where the diagnosis of abortion is not absolute and the loss of blood is slight. But above all else the temperature and pulse must be watched like a treasure. By rest in bed the abortion is occasionally averted or it passes off itself, and without the introduction of the finger by doctor or midwife the patient is seldom infected.

Another plan may be required. If the patient is bleeding and she lives some distance from a physician, she should be well tamponed in the vagina by cotton balls soaked in 2- or 3-per-cent. carbolic acid. The tampons are packed tightly around the os by aid of a speculum, and the vagina should be filled. I do not think the packing should remain in the vagina longer than ten to fifteen hours, when it should be changed or removed and some other treatment pursued.

Still another class of abortions must be considered, namely, the incomplete. The patient gives a history of continued hæmorrhages for several weeks or months. There is only one kind of treatment which I recommend for such cases: dilatation of the uterus and removal of the placental remains.

In all this work one cannot lay too much stress on, or repeat too often, the idea that aseptic conditions must be secured, that it is a crime to infect a woman, and that in obstetrics there exist more legal and moral claims to asepsis than in any other department of medicine. In my opinion the instruction in obstetrics and gynæcology should never be entirely separated, for the gynæcologist's labors depend on those of the obstetrician.

Much is said among physicians and the laity about threatened abortions. Threatened abortion is a very uncertain subject—first, because we cannot diagnose early pregnancy; and secondly, because we have no means of knowing when a woman will abort until a late sign appears. But there is no doubt that in women supposed to be pregnant, if the os is undilated, pelvic disturbances are often checked and abortion avoided by rest in bed.

The general sequelæ of abortion are infection, hæmorrhage, anæmia, and displacement of the uterus. The inflammations which frequently follow abortion are endometritis, metritis, salpingitis, ovaritis, *plus* as much peritonitis as the infection involved as it dropped out of the mouth of the tube. I have never yet positively observed a case of cellulitis following abortion, but in autopsies have found quite a number of cases of cellulitis.

A typical case illustrating the results of abortion, and one which has scores of times presented itself in my clinic, may be taken as a sample for diagnosis and treatment. The patient has had a child at term. Six months ago she had an abortion. She says she got up in four days and was well for two weeks, when she began to feel ill. At that time she had considerable leucorrhœa. She is quite ill at the monthly periods, the leucorrhœa being then very much increased and the menses profuse and prolonged; her pain is so severe that she is obliged to keep her bed during the flow, which she never did before. She complains of poor appetite, and of pain in the stomach, back, and pelvis. She is anæmic and neurotic. When she is placed on the examining-table, and the finger is introduced into the vagina, the fourth landmark of gynæcology becomes apparent: the finger feels the uterus fixed. A large boggy mass is felt on the left side, and a smaller one on the right. The uterus is hard, and from the os flows a purulent fluid. The patient is tender to the touch of the examining finger. Micturition is abnormally frequent, and constipation has become established (the latter fact partially due, no doubt, to the patient's reluctance to obey the calls of nature on account of the pain attending defecation).

Such a picture is what I mean by the gynæcological landmark of abortion; and I shall endeavor briefly to interpret its meaning and to suggest appropriate methods of treatment. In the first place, the vulvar redness is generally due to acrid secretions or gonorrhœa. The uterus secretes a purulent fluid, which can be seen pouring out of the external os, giving evidence of endometritis. If a sound is introduced, it draws blood; the endometrium is very vascular, and its glands are now in a state of exaltation, secreting abundantly. If the inflammation is recent, there will be added to the uterine hardness a tenderness which renders the touch of the surgeon's hand painful. The patient has metritis. The boggy masses on each side are the tubes and ovaries held firmly together by inflammatory products, and surrounded by exudates and adhesions. Infection has traveled up the tubes from the endometrium and caused endosalpingitis; then, dropping out of the fimbriated end, it has fallen on and infected the ovary. The ovarian disease is thus secondary to the tubal. The infection has also reached the pelvic peritoneum, causing exudates, bands, and adhesions. The peripheral ends of the pelvic nerves are now being dragged and pressed upon; hence the neurosis of the patient.

The diagnosis of the case outlined above is: (*a*) Vulvitis; (*b*) endometritis, *plus* (*c*) metritis; (*d*) salpingitis; (*e*) ovaritis, *plus* (*f*) pelvic peritonitis.

The woman is ill in many ways. The illness is due to reflex action on the nervous system, and is generally according to the degree and duration of the pelvic disease. The original point of *irritation*, physical examination has located in the genitals. Disease is found to exist distinctly in the pelvis, in the organs which lie chiefly at the periphery of the hypogastric and ovarian plexuses. These organs are supplied by the third and fourth sacral spinal nerves; so the reflexes will involve both sympathetic and spinal nerves, the former in so far as they supply the uterus, tubes, and ovaries. The reflexes cease neither day nor night.

The second point we observe is that the patient has *indigestion.* Irregularity and constipation of the bowels exist. She complains especially of pains about the stomach. Eructation of gas is common. Sudden formation of gas in the stomach and bowels positively indicates that the digestive tract is not performing its functions normally. Her appetite is poor. Her skin is often a dirty brown color. Enough pigmentation of the skin is seen to indicate that something is wrong with the liver. One might call such trouble a kind of fermentative dyspepsia. The explanation I offer is that it is a result of reflex irritation from the diseased genitals, as described on pages 34–38.

Then follow, in too many cases, *malnutrition*, *anæmia*, and *neurosis.* The patient has become irritable. She cannot sleep, nor rest. She is so nervous that she cannot work. She is melancholy, gloomy, irritable, morose, ill-tempered, and, in short, ill. From the evenly poised temperament and genial disposition she has become a nervous wreck, and life is really a burden. Her nerves are fed with waste-laden blood.

The general health must be strengthened by tonics, rest, and baths. Constipation or other intestinal irregularities must be remedied; epsom salts and regular hours for stool will do much in this direction, as already stated. Insist on regular evacuation of the bladder.

If a vaginal examination reveals the usual pathological train — vulvitis, endometritis, metritis, salpingitis, ovaritis, and pelvic peritonitis—see to it that the vulva is washed with warm water and soap daily. If it be a case without pus in the tubes or pelvis, apply the douche as directed on page 51. The salt stimulates the mucous membrane without causing reaction. The alum, though in small quantities, acts as an astringent and lessens the leucorrhœa. From one to three cotton or wool tampons soaked in glycerin should be placed in the vagina twice a week, and allowed to remain in about ten hours; a more frequent application may irritate. Should the endometritis still persist, no pus being in the tubes, the uterus should be carefully dilated and curetted, then filled with gauze, or a rubber tube should be introduced and stitched in by a suture through the cervix. If the cervix is lacerated, it may be repaired, but generally the trouble lies in the endometritis.

A good rule is to insist on as much rest at menstruation as possible.

In young women, frequently much damage is done to the position and circulation of the genitals by a full bladder and a full rectum.

If gonorrhœa complicates abortion, the patient seldom recovers entirely.

The effects of the douche and tampon are: (1)

The parts are kept clean and free from irritation; (2) the tampon depletes the serum from the genitals and allows them to contract; (3) the hot water contracts the uterus, thus preventing excess of blood; (4) it contracts the lymphatics; (5) the veins are made to contract and also to assume their original and natural spiral or twisted condition—the more crooked or spiral the venous plexuses of the genitalia, the more healthy the circulation; (6) the hot water induces the muscular and elastic tissue to contract and assume tone—many times patients have come to me when three or four fingers would easily glide into the patulous gaping vagina, and in four to six weeks the vagina would feel tight on one finger, so great had been the contraction of the parts from the hot douche and glycerin tampon; (7) the treatment induces the uterus, tubes, and ovaries to return to normal position —the essential supports of the uterus have shortened and become natural, and the circulation of the genitals has been restored; (8) the douche-and-tampon stimulates the periphery of the extensive nerve apparatus ending in the genitals. The treatment then acts as a local and general tonic. I have many times advised patients to take the douche to stimulate them when weak or tired. It acts like a hot bath.

The dangers of surgical interference with the uterus must never be forgotten. Two practical reasons may be given for this statement. *First*, if there is pus in the tubes, manipulating the uterus is dangerous because rupture of the walls of the pus cavity may occur and new infection take place. I know of several cases of death due to sounding and dilating the uterus while pus existed in the tubes. *Secondly*, in the most trifling or grave operations aseptic precautions must be scrupulously practiced, and the failure to do this may and often does result in infection or the stirring anew of some old infection.

It is well to suggest in these pelvic troubles that coition be limited, for rapid circulation and nerve changes react unfavorably.

Finally, if there be pus in the tubes or ovaries, and if the woman be probably sterile and subject to pain which makes life miserable, the tubes and ovaries should be removed. Intra-uterine applications except for very definite purposes are not to be commended. Such applications in the office should be emphatically condemned. Frequent introduction of the sound is not necessary. The sound has done more harm than good, and its usefulness is very limited—in fact, the practical gynæcologist seldom uses it.

Sterility following abortion is very common, because the inflammation so distorts and fixes the appendages that the tubal transmission of an ovum is rendered impossible.

Many a woman dates her chronic illness from an abortion.

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